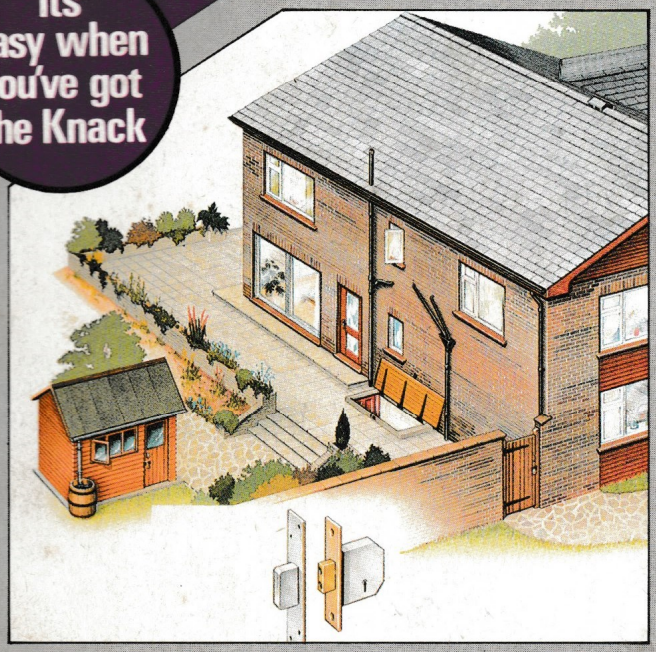
A Marshall Cavendish Publication in weekly parts

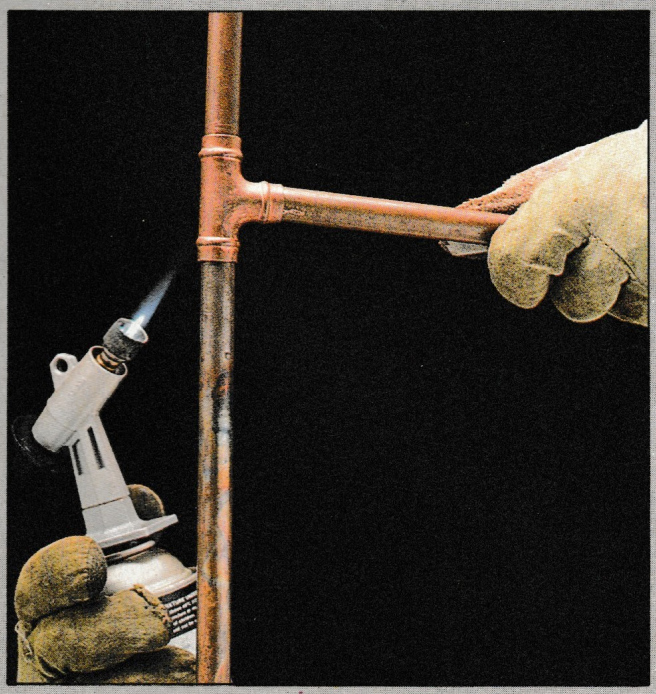
Part 6

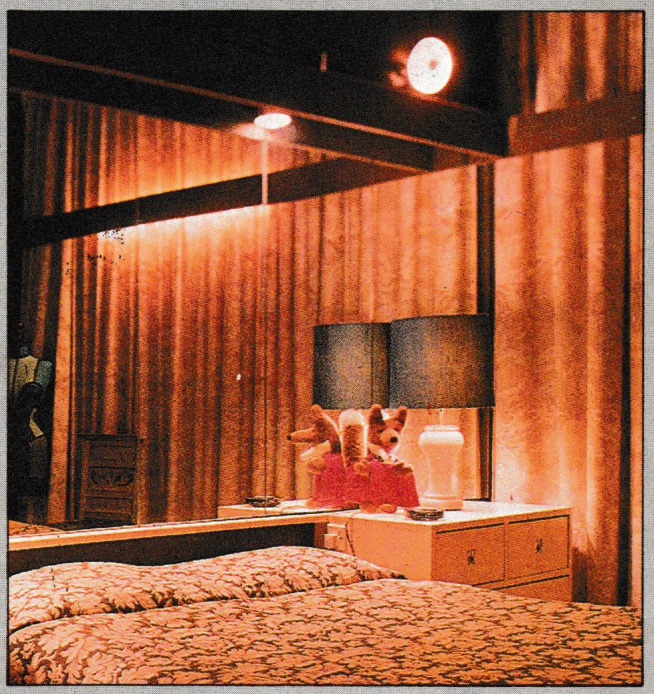
THE KNACK

The complete manual of DIY skills, projects and home ideas

It's easy when you've got the Knack







UK 55p Australia $1.50 New Zealand $1.50 South Africa R1.25 Malta 50c Singapore $3.00

THE KNACK

Contents Part 6

Home designer
On reflection 149
Project: Feature wall mirror
How clever use of mirrors can add an extra dimension to your home

Plastering course 1
First steps in plastering 156
Step-by-step through the basic plastering techniques

Project
Simple security 160
Useful advice on how to protect your home against burglars

Carpentry course 4
The art of planing 165
Project: Build a toy truck
How to use and look after the most common types of woodwork plane

Plumbing course 3
Using a blowlamp 171
Project: Install an outside tap
Comprehensive instruction on working with the plumber's most valuable tool

Editorial Staff

Editor
Richard Chapman
Art Editor
Maggi Howells
Deputy Editor
Martin Preston
Sub Editors
Tom Hibbert
John Ward
Lorraine Bacchus
Felicity Jackson
Designers
Lee Thomas
Shirin Patel
Christina Fraser
Technical Consultant
Roger Smith
Editorial Secretary
Sue Ashby

The index

The last two parts of The Knack will form a complete fully cross-referenced index. For easy access to the information in your growing collection, interim indexes will be published to cover each 14-part volume. For quick reference, reminders on what has been covered so far in the volume will appear on the inside back cover.

Published by Marshall Cavendish Partworks Ltd.

© Marshall Cavendish Ltd. 1980.

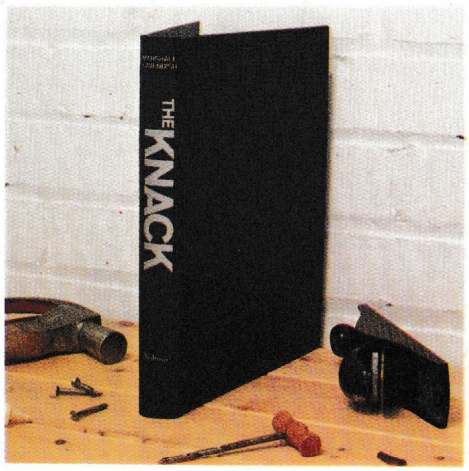
Printed in England by Varnicoat Ltd.

Copies by post

Our subscription department can supply your copies direct to you regularly and at 55p each. For example: the cost of 26 issues is £14.30 and for any other period simply multiply the number of issues required by 55p. These rates apply anywhere in the world. Orders with payment to Subscription Department, Marshall Cavendish Partworks Ltd., 58 Old Compton Street, London, W1V 5PA. Be sure to state from which issue you wish to start and leave the rest to us.

Back Numbers

Copies of any weekly part of The Knack can be obtained from these addresses at the regular cover price.
UK & Eire: The Knack Back Numbers, Dept. XX (M/C Ltd.), PO Box 80, Slough, SL3 8BN. Price 55p per part.
Australia & New Zealand: Back numbers are available through your local newsagent at $1.50 per part.
South Africa: The Knack Back Numbers, Central News Agency Ltd., Federal Packing Division, PO Box 613, Cape Town. Price R1.25 per part (please add sales tax).
Malta: Back numbers are available through your local newsagent at 50c each.



How to obtain your binders

Each binder holds 14 parts.
UK and countries not covered below: Send £2.70 plus 45p postage and packing (for each binder ordered) to—The Knack Binders, Dept 655 (M/C Ltd.), PO Box 80, Slough, SL3 8BN.
Eire: Send £2.70 plus 45p postage and packing (for each binder ordered) to—The Knack Binder Dept., Marshall Cavendish Partworks Ltd., 58 Old Compton Street, London, W1V 5PA.
Australia: Binders are available from your local newsagent or from Gordon & Gotch Ltd., PO Box 767 G, Melbourne.
New Zealand: Send $7.60 plus $1.40 tax for each binder to—The Knack Binders, Gordon & Gotch (NZ) Ltd., PO Box 1595, Wellington.
South Africa: Binders are available at R5.50 (please add sales tax) from any branches of Central News Agency. If you have any difficulty in obtaining your binders please write to International Magazine Distributors (Pty) Ltd., Central News Agency Ltd., PO Box 613, Cape Town, enclosing a postal order for the cost of the binder plus sales tax and 50c postage for each binder.
Malta: Your newsagent can supply binders at £M2.50 each.

On reflection

Mirrors are marvellous for faking what a room often lacks. The illusions of different dimensions and extra light they give to a room make them one of the most versatile forms of decor

Below: *Perfect positioning of wall mirrors brings harmony to a room by the clever reflections of the corner suite and the roller blind's matching fabric. Reflecting a window makes the room twice as light*

Elizabeth Whiting

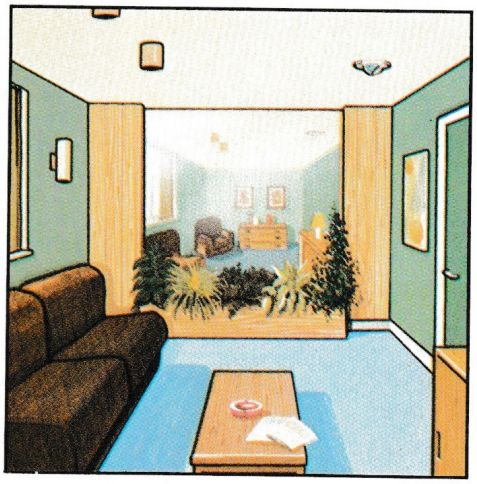
Home designer

When you use mirrors as part of your design scheme you are dealing with illusions. These are no mere looking glasses. Height, length, width and light can all be created by reflection and as space is so often limited in a modern home, mirrors have an important role to play.

The most extravagant and luxurious effects are created where a mirror completely covers a wall. Here the mirror itself must seem to be invisible —it should give the impression that if the wall on which it is fixed was not there you could walk right on through it.

You can give the impression of a much longer room, for example, by fitting a floor-to-ceiling mirror panel in the centre of an end wall. But the junction of the mirror with the ceiling and floor must be hidden. The whole effect is lost if the mirror extends down only as far as the skirting board or up as far as the picture rail. For the illusion to be successful, there must be no obvious break in the reflected image.

Below: *A mirror fixed at the end of a room visually doubles its length and creates an area of interest*



Venner Artists

Ray Duns

A ribbed ceiling treatment will conceal upper edges and the skirting board can be removed to allow the mirror to be fitted flush to the floor. Flanking the mirror either side with a panelled, decorative wallcovering conceals the side junctions so that the image is contained. This means that the eye is not disturbed by the image coming to an abrupt end.

A mirror fitted perfectly into the shape of an alcove or recess will give immediate impact. The depth of the room will be enhanced and the mirror is an ideal background for ornaments or plants. The plants will look particularly attractive, doubling in apparent density and providing a gentle screen for the people in the room from their own reflections. It can be disconcerting to sit in front of a mirror reflection of yourself and so it is best to position mirrors where they reflect the surroundings and not the people in the room.

Left: *Floor-to-ceiling mirrors on the side wall of a narrow passage make it seem twice as wide*

Above: *A bedroom's subtle, warm atmosphere is softly reflected in its wall-to-wall mirror—without which the room would seem to come to a dull and abrupt end*

An effective and practical use for large mirror panels is in narrow passages and hallways. Floor-to-ceiling mirrors here help give the appearance of space, as well as reflecting light in what are often rather dark areas. On an end wall a mirror makes the hallway seem longer; put on a side wall it adds width.

You must remember, however, that although mirrors are fairly tough, even the thicker ones are vulnerable at floor-level. Vacuum cleaning, knocks from toys or other hard objects, even accidental kicks and scuffs can all crack a glass surface. Positioning the mirror about three metres from the floor along the full length of a wall is an attractive alternative which will provide many of the same effects and may be safer where there are small children or old people to consider.

Add variety

Where you want something more interesting than a plain mirror surface there are several alternatives to consider for each room.

Flexible mirrors are available for contoured surfaces, such as going around corners. They are made up of small rectangular or square mirrors on a flexible backing. This kind is used purely for creating a decorative effect in a room, as even when laid flat the image from the mirrored surface is slightly distorted.

Mirror tiles also break up the reflecting surface, but do so without distortion. They are extremely easy to fix—usually they have self-adhesive tabs on the back—and are therefore suitable for large areas where a single sheet of glass would be difficult to cut and handle.

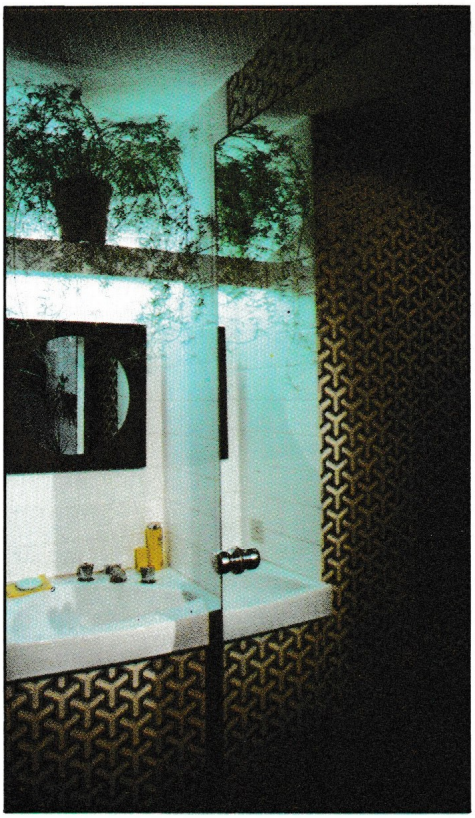
Furniture can have mirror tiles incorporated in it for unusual effect—for example, shelving, tables and room dividers—but remember, for a mirror to be effective it must have something attractive to reflect.

Mirror tiles will help make any room lighter if they are fitted in the inner reveals of the windows. Tiny mirror tiles set at right angles to the window look good and seem to double the window's length as well as the view it gives.

Using mirror tiles in this way is perfect for the kitchen which usually gets rather neglected as far as mirrors are concerned. When necessary, they are as easy to wipe down as ceramic tiles—and a quick rub over with the window cleaner restores their sparkling reflection. They will also add light to a work surface if they are fitted behind worktops.

Elizabeth Whiting

Above: *A simple yet totally effective treatment—the mirror's picturesque reflections create interest in an otherwise barren area*



Elizabeth Whiting

Above: *A door which is a mirror opens up enclosed areas and provides full-length reflections where there is a lack of wall space*

Below: *Searching for an antique mirror unit to renovate is worth the effort for its unusual appearance*

Elizabeth Whiting

All small areas—under the stairs, confined work or storage areas—are opened up by the addition of a mirror because it helps to distribute whatever light is available.

When light—sunlight or electric—catches a geometric pattern of different sized (mainly small) mirror tiles, it throws a kaleidoscope of pattern around the room. The colourful image within the wall of mirror tiles also makes a lovely focal point for any room in the house.

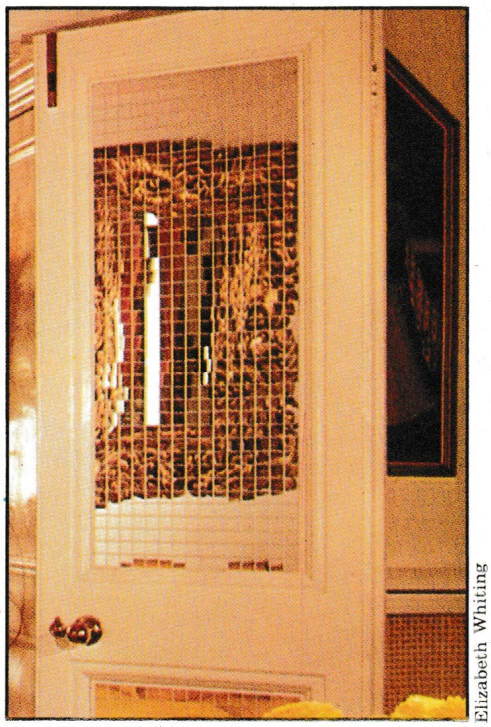
Mirror tiles come in a wide range of sizes and colours—the most popular being silver, bronze and grey.

Smoked glass gives a soft, flattering effect and can be used to advantage in many situations where a bright clear reflection is not needed. In living rooms it can give a sophisticated appearance to an alcove or wall and provides a flattering reflection for large areas in a bathroom, bedroom or hallway. Such mirrors give everyone an instant suntan!

Elizabeth Whiting

Left: *Not an inch of dull space—the large wall mirrors see to that*

Below: *A dazzling look for a plain door with a panel of mirror tiles*



Elizabeth Whiting

Alternative finishes

Reflecting float glass is another unusual finish with many decorative possibilities.

When light shines behind it, the effect is of normal clear glass but when the conditions are reversed—with light shining on the front and darkness behind—the float glass becomes a mirror. This property makes it ideal as a room divider or as a hinged screen in a bedroom or bathroom—for additional privacy.

There are several modern alternatives to silvered glass for reflecting surfaces. Although they may not be cheaper, they are much lighter and easier to cut and fix than traditional glass mirrors and so can be adapted to many different uses. They are also often more suited to weak partition walls which could not support the weight of a full wall of glass.

For walls and ceilings a most suitable mirror effect is provided by acrylic, mirror-face chipboard. This is especially useful for disguising uneven ceilings. But it is unsuitable for bathrooms as the porous chipboard backing will be affected by condensation—it will swell and warp.

Ideal for bathrooms is the plastic mirror fixed to polystyrene sheets. It gives a good reflection, is extremely light and because it is warm, is not so prone to steaming up as conventional glass. It can also be cut to size with a saw and comes in many colours.

Also for steamy bathrooms are plastic mirrors which have been vacuum-coated with aluminium to minimize misting.

Glass mirrors in bathrooms—unless they are made of very high-quality float glass—are particularly vulnerable to losing their shine, as the silvering is often affected in the long-term by steamy conditions. If the back of the mirror is permanently damp, its silver will disintegrate. An air space left behind the mirror, so that the air can circulate, will prevent this. But make sure, if you frame a mirror yourself for the bathroom, that the seal is watertight.

Whatever reflective material you use, you should follow the manufacturer's instructions explicitly when applying it.

Small is beautiful

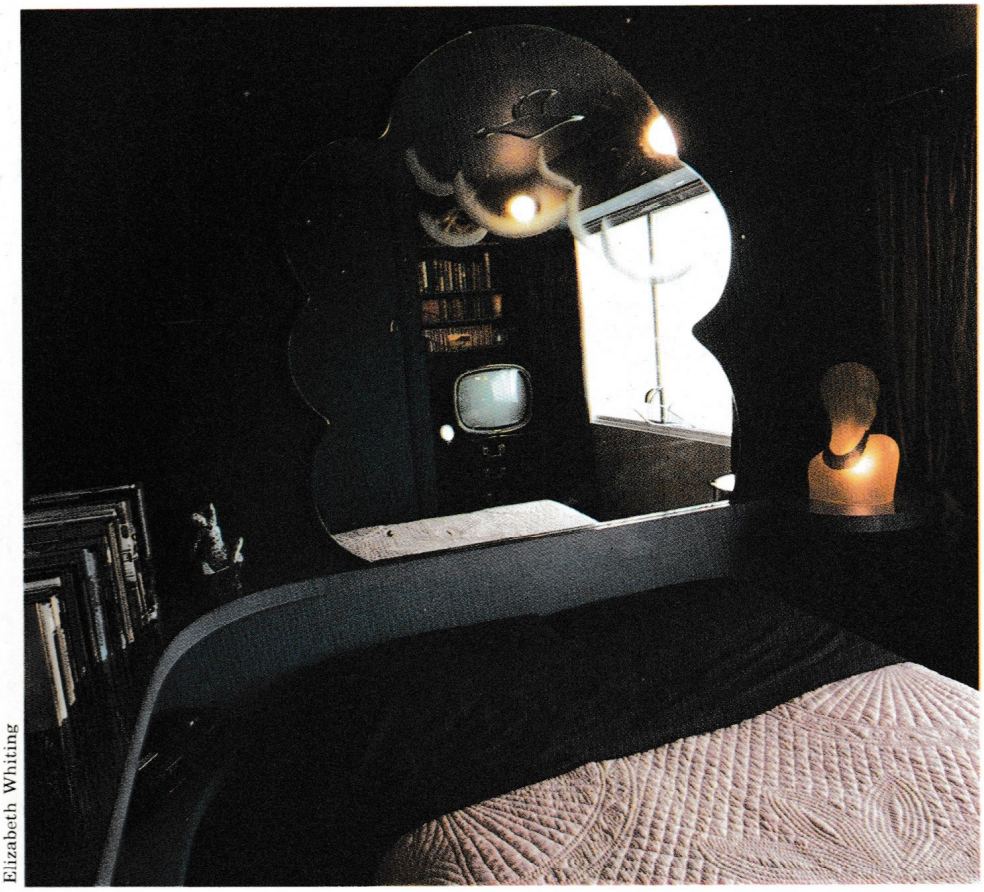
Sometimes you want to put a mirror in a room purely as a looking glass—and then it must be positioned so that it gives the best possible reflection.

Shaving or making-up require a well-lit, plain mirror. Those with a choice of normal or magnifying reflection are ideal—especially if they are on a swivel so they can be angled towards the light.

Where it is not possible to fit a mirror near a window, you can improvise by siting it opposite a plain, pale-coloured wall. With the reflected light from this, the image—especially the outline of clothes—is clearer.

For full-length vanity you need either to fit a very large mirror or to have room to step back far enough to see a full-length reflection in a smaller one. In some bedrooms neither of these options is possible.

One answer to this problem is a convex mirror (like a television screen) which will give a full-length reflection from a relatively small



Elizabeth Whiting

distance away. You may have to order this from a large department store but it comes complete with wooden frame for immediate use.

The traditional triple hinged mirror on a dressing table has never dated—nor has its decorative and practical potential to the bedroom been diminished. Its reflections of your dressing table ornaments, the additional space it brings to the area, the almost full-length view provided by the normally hinged centre mirror—all these properties make this simple, small mirror an attractive success.

Mirror pictures

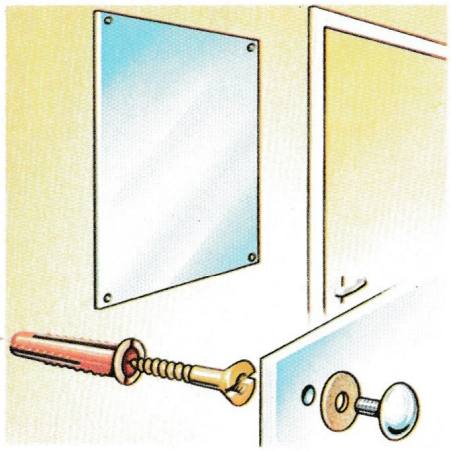
A mirror can be a beautiful object in its own right, whether it is an antique in a lovely delicate gilded frame or a bright, modern reproduction of an old advertisement. Intended purely for their decorative value, these mirrors enhance the walls of any room.

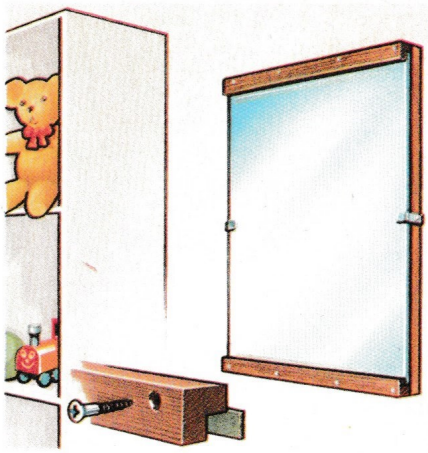
The variety of mirrors is endless and chosen and placed with care they will add their special light and gleam to every room in the house.

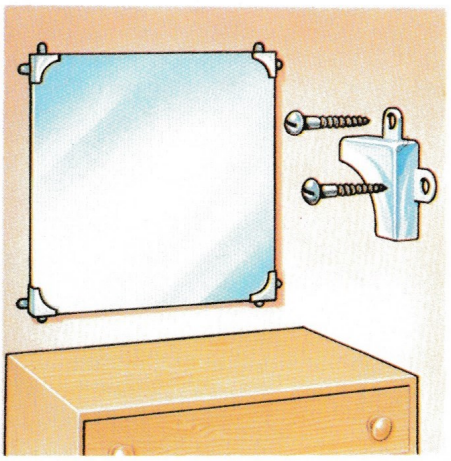
Left: *This unusual mirror becomes the focal point in a bedroom where wall space is limited*

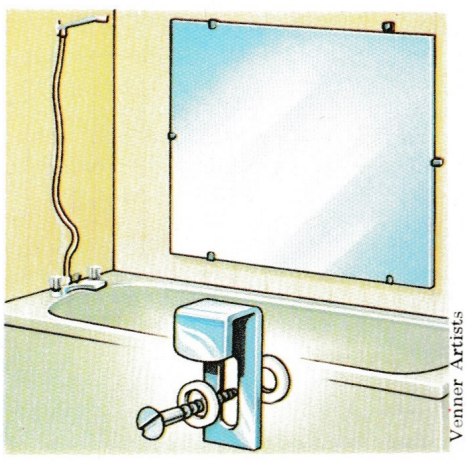
Four ways of fixing mirrors

Right: *To screw-fix a pre-drilled mirror, measure accurately where the mirror is to go—making sure it is straight—and mark the drill hole positions. Use wall plugs in the drilled holes and when screwing in place, make sure that the mirror is protected by screw cap washers in front and spacer washers behind.* **Far right**: *A rebated rail fixing needs rails top and bottom with clips at the sides of the mirror to prevent movement.* **Below left**: *To fix a mirror with corner clips, mark the position of the bottom two first, drill the holes and screw them into place. Slot the mirror into these clips and place the top two in position. Mark off the drill holes, take out the mirror and fix the top clips in place.* **Below right**: *Sliding clips should be fixed about 25mm from the corners of the mirror. On the wall, draw round the mirror shape and measure off the positions of the sliding clips. Drill and screw them all into position and first fix the mirror in the bottom two. Then pull back the side and top clips and push them over the mirror*









Venner Artists

Feature wall mirror

Maison De Marie Claire/Bennett/Ertaud

The most effective ideas are often the most simple ones. This set of mirrors is easy to make and yet its professional appearance can be easily adapted to any room. Whatever the shape of room or wall space available, use two supporting rails for a versatile set of sliding mirror panels.

If you dislike the natural wood finish of the frame, it can be painted to blend in with the rest of the room's decor. And when you tire of the position of the mirrors, slide them together to make a solid block or have only one space instead of two.

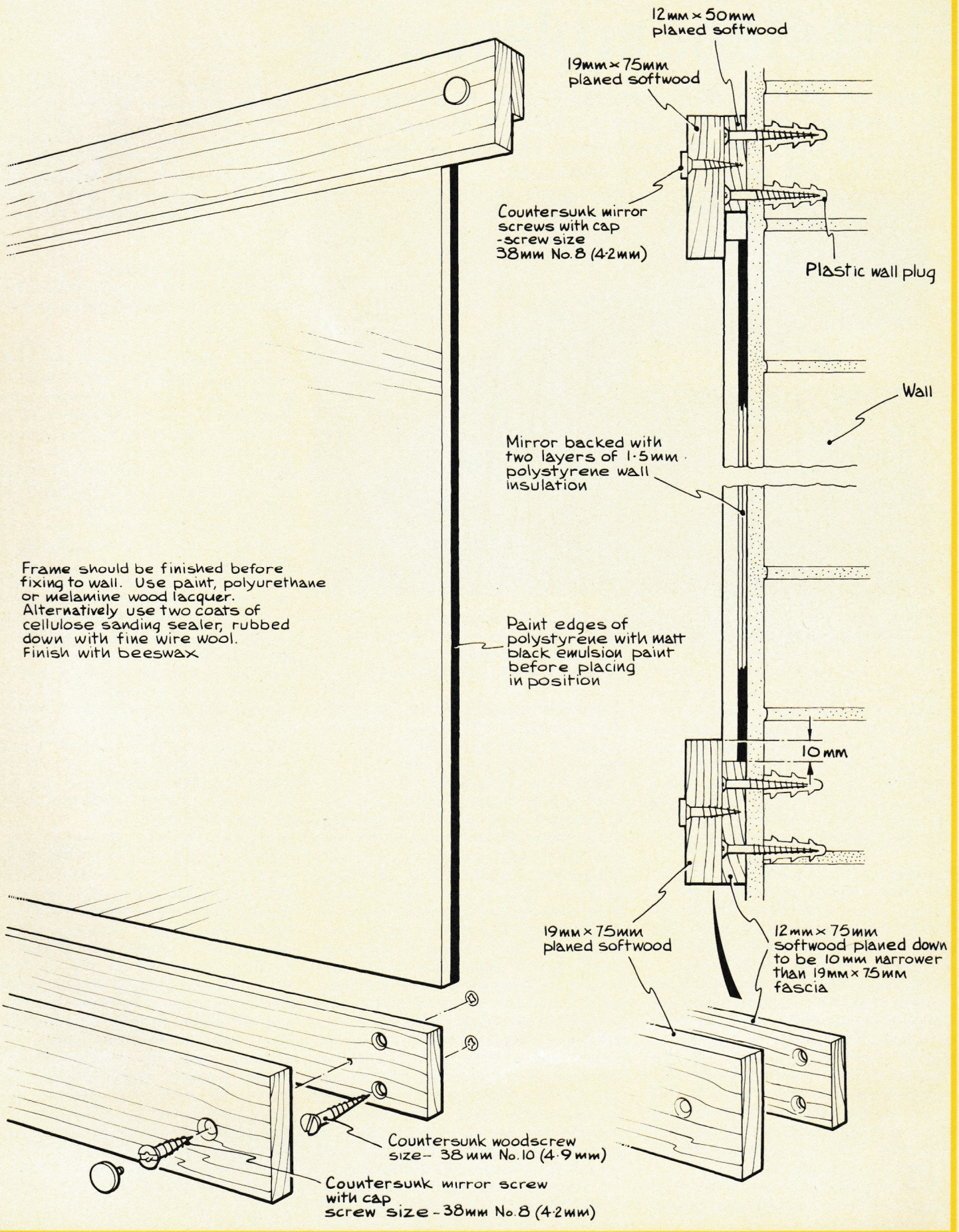
Whichever way you decide to position the mirrors, however, always make sure that there is something interesting for them to reflect. This is where the art of using mirrors comes in: if you position them opposite a blank wall, the effect is going to be no more exciting than another blank wall.

The area behind a settee is often a difficult one to decorate, but with this mirror arrangement you can overcome the problem, while adding new dimensions to the room.

In a bedroom, this mirror would make an interesting bedhead, and in a bathroom a special kind of splashback along the side of the bath. Or on one side of a narrow passageway—positioned at the right height—a mirror arrangement such as this saves a lot of redecorating. Mirrors can be wiped clean of fingermarks indefinitely, unlike most other wall coverings.

Be sure to check that your wall can withstand the considerable weight of three mirrors—stud partitions are not suitable. If in doubt, use heavy duty fixings for the supporting battens, especially the bottom one. Use extra screws on the bottom batten if you are using extra large mirrors.

Above: *One of the ways in which this simple mirror arrangement could be used—as the focal point for the often bare area behind a settee*


12mm × 50mm planed softwood
19mm × 75mm planed softwood
Countersunk mirror screws with cap -screw size 38mm No.8 (4·2mm)
Plastic wall plug
Wall
Mirror backed with two layers of 1·5mm polystyrene wall insulation
Frame should be finished before fixing to wall. Use paint, polyurethane or melamine wood lacquer. Alternatively use two coats of cellulose sanding sealer, rubbed down with fine wire wool. Finish with beeswax
Paint edges of polystyrene with matt black emulsion paint before placing in position
10mm
19mm × 75mm planed softwood
12mm × 75mm softwood planed down to be 10mm narrower than 19mm × 75mm fascia
Countersunk woodscrew size – 38mm No.10 (4·9mm)
Countersunk mirror screw with cap screw size – 38mm No.8 (4·2mm)

Advertising Arts

First steps in plastering

Types of plaster ● Essential tools ● Preparing the surface ● Mixing the plaster ● Repairing a damaged section ● Applying the base coat ● Finishing off ● Patching corners

Plaster can be applied to solid surfaces, such as bare brick, cement rendered brick, building blocks or concrete, and to surfaces to which a key for the plaster—such as metal lathing or wooden slats—is attached. On most solid surfaces two coats of plaster, known as the floating coat or undercoat and the setting or finishing coat, are applied. When lathing is fixed to the surface, an additional first rendering coat is necessary called a pricking up coat.

Plasters

Two basic types of plaster are in common use: traditional plaster (or cement render)—a mix of sand, lime and cement or plaster of paris—and proprietary ready-mixed plasters.

The main constituent of ready-mixed plasters is gypsum, calcium sulphate, which has been partly or wholly dried in a kiln. The extent to which the gypsum has been dried, and the addition of further constituents during manufacture, determine the type and grade of the plaster. However, as water is detrimental to gypsum plasters after they have set, they should not be used for external work.

Gypsum plasters fall into three main categories. Each type of plaster is used for a specific job.

Above: *Plaster is applied to a wall with a laying-on trowel. When you are spreading plaster, keep the trowel's top edge tilted towards you.*

Retarded hemihydrate plasters: Any undercoats of this type have to be mixed in the proportion one part plaster to three parts sand.

Anhydrous plasters: These are used only as finishing coats and must be applied over sanded undercoats, either retarded hemihydrate undercoat or a mix of sand, lime and cement.

Pre-mixed lightweight plasters: These are ideal if you have not done any plastering before as they need only the addition of water to make them workable. They are easy to mix and, being lighter than other types, are simpler to work with. There are lightweight plasters for both undercoats and finishing coats and they are suitable for most applications in the home. Check with your dealer, or the manufacturer, that the undercoat type is suitable for the surface to be plastered. There are undercoat plasters for porous and non-porous surfaces and plasters containing rust inhibitors for use on metal lathing.

Always store plaster in a dry place. If any water comes into contact with plaster before it is used, the properties of the plaster will be altered. You should use plaster as soon as possible after buying, as the retarder—the constituent which governs the setting time—grows less effective with time. Plaster is usually date stamped on the bag and, whenever possible, you should use the plaster within six weeks of the date.

Tools for plastering

For any plastering job, even a small one, the following equipment is essential for success.

Spot board: This can be a piece of exterior grade ply about $1m^2$ and is used for holding the mixed plaster. A couple of coats of exterior grade polyurethane wood lacquer will help to preserve the wood. The board should be placed on a stand—a wooden crate or sturdy stool will do—at a convenient height from the floor. The board should overhang the stand slightly so that the hawk can be held under the edge when transferring the plaster on to it.

Hawk: An aluminium, timber or plastic hand board about $300mm^2$, used for carrying plaster from the spot board to the work area and for holding the plaster as you work.

Laying-on trowel: Used for applying and spreading the plaster. It has a rectangular steel blade about 280mm x 120mm attached to a wooden handle. Some trowels have curved handles which are easier to grip. A trowel of good quality is important as it is hard to obtain a smooth finish with a worn or inferior blade.

Gauging trowel: Available in a variety of sizes and used for repairing areas too small to be worked with the laying-on trowel. It is also useful for mixing small quantities of plaster.

Skimming float: Traditionally, a planed, flat, straight grained piece of timber, about 280 x 120 x 10mm, with a wooden handle. Modern plastic skimming floats are now in use as they are lighter and do not warp. The skimming float is used for levelling the floating coat, and, except with lightweight plasters where the laying on trowel is used, for applying and straightening the finishing coat.

Scratcher: To ensure the adhesion of the next coat of plaster, the surface of an undercoat is scratched over. A suitable scratcher can be made by driving a few nails into a piece of wood and then cutting off their heads

with a pair of pincers or pliers.

In addition, you will need two buckets—one for mixing the plaster in and one for holding water—a distemper brush and straight-edged rules of various lengths depending on the size and nature of job. Also required, for chipping off old plaster, are a hammer and a bolster.

Preparing the surface

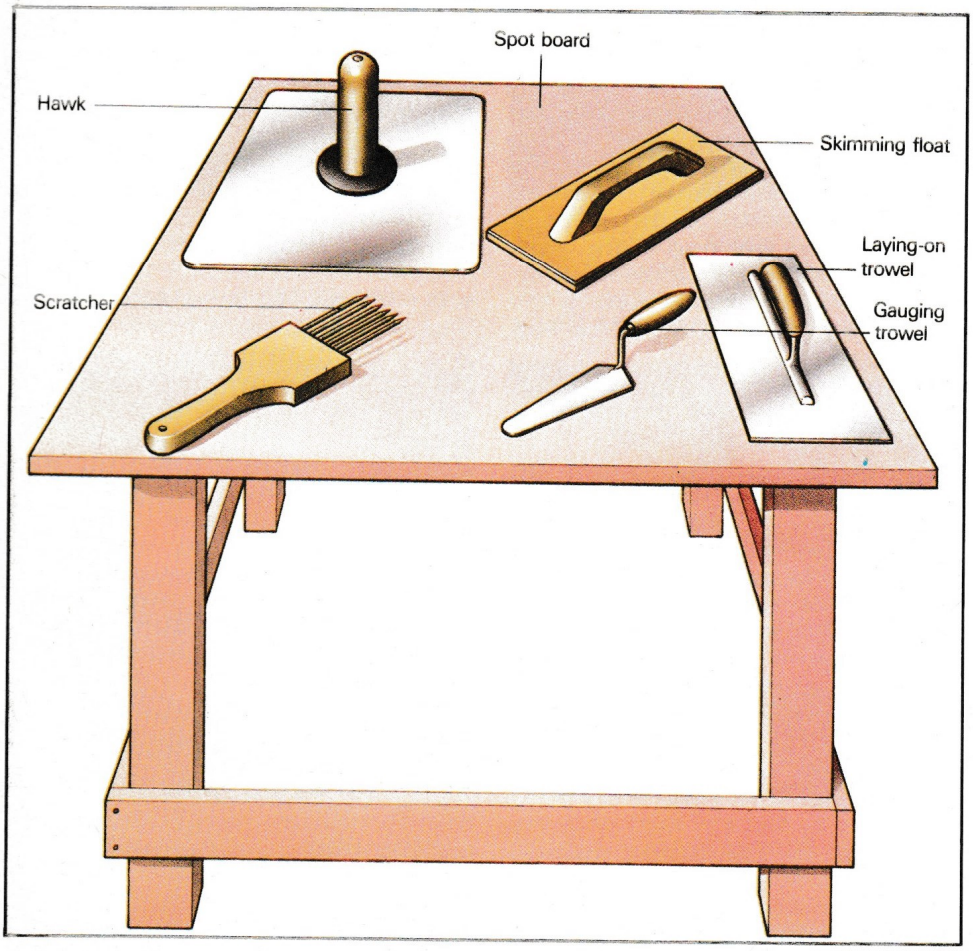
Before you start, clean the room of furnishings as much as possible, as the plaster dust will fly everywhere and can scratch polished surfaces. Cover what you cannot remove with old dust sheets. Have ready a suitable receptacle for the old plaster.

If you are plastering a patch, cut away all surrounding plaster until you reach sound plaster. Then cut the patch right back to the wall. It will make plastering considerably easier if you cut the patch into a more manageable shape at this point. First draw some straight pencil lines around the patch, then cut away the plaster up to the lines using a hammer and bolster (fig. 1).

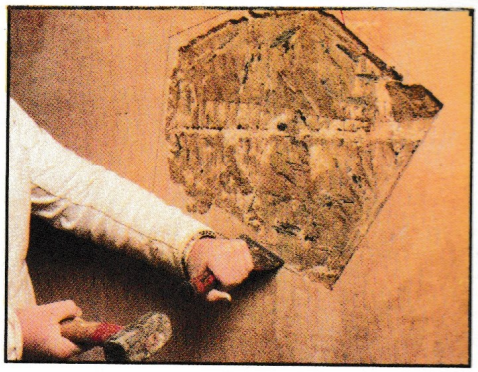
If the wall behind the plaster is of clay brickwork it will need only brushing down and damping with clean water before you start to apply the new plaster. With old brickwork, however, test the joints between the bricks and if they are soft rake them out a short way. Then use an old brush to lightly wet the brickwork and the edges of the surrounding plaster with clean water. If you do not wet the brick work it will quickly absorb water from the new plaster, causing the plaster to dry too fast and crack. Too much water, however, will cause the the plaster to slump and fall off the wall when you come to apply it.

Concrete wall surfaces require special preparation as their smoothness provides a poor key for plaster and their density gives low suction. A rendering coat of lightweight bonding plaster, applied according to the manufacturer's instructions, or a PVA chemical bonder which is applied with a paintbrush, will give the necessary adhesion. Alternatively, cover the surface with a criss-cross grid of lines, not more than 50mm apart, by hacking with the hammer and bolster. This is hard work and is not recommended for large areas.

Below: *Tools for plastering. Try to buy a good quality laying-on trowel*



Bernard Fallon



1 *Before you begin to replaster a patch, use a hammer and bolster to cut straight lines round the area. This makes plastering much easier.*

Mixing plaster

When mixing plaster of any type use only water that is fit for drinking. Any impurities in water may be detrimental to the properties of plaster.

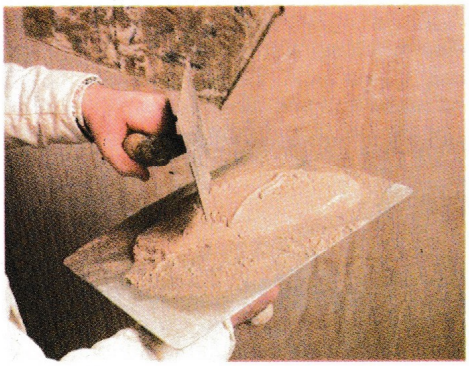
Pre-mixed lightweight undercoat for plastering small areas should be mixed a third of a bucket at a time. This is sufficient to cover a patch of about 300mm x 300mm to a depth of about 10mm. If the area to be plastered is larger than this, it is better to mix further amounts later. Pour water into the bucket first, then add the plaster. If the plaster is put in first, it clogs when the water is added and sticks to the bottom of the bucket. Add the plaster, while stirring the mixture with a stick, until a stiff but workable mix is obtained.

If sand is needed for the undercoat it is important to use a good quality fine building sand. If sand has any impurities such as loam and clay, the setting time and also the strength of the plaster will be affected. Mix the plaster powder and sand together, following the manufacturer's instructions, before adding the mixture to the water.

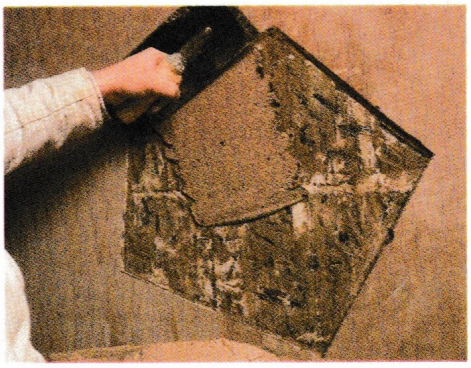
If you decide to use a cement render traditional mix under a lightweight finishing plaster, you will need a level surface such as a *banker*—a board about 2m x 1.5m with boards about 250mm high on three sides. Mix the constituents in the proportion 1 part lime, 1 part cement and 6 parts sand, by turning them over with a shovel. Next make a ring in the centre of the mix and gradually pour water into it. Push the surrounding mixture into the water and mix thoroughly.

Lightweight finishing plasters are applied thinly so they can always be mixed in a bucket. Pour water into the bucket until it is about a quarter full. Slowly pour in the plaster until

2 *Scrape some of the mixed plaster from the spot board onto the hawk with the laying-on trowel. Then trim off any excess plaster*



3 *Hold the laying-on trowel at an angle over the hawk and tilt the hawk slightly in order to snatch up a manageable amount of plaster*



4 *Hold the trowel against the wall surface, keeping its upper edge tilted backwards at an angle of about 30°. Draw it upwards over the patch*

5 *Apply further undercoat plaster until the patch is filled in and the new plaster is level with the old surrounding plasterwork*

6 *Take a straight-edged length of wood that is a little longer than the patch and draw it upwards to make the plaster flush with the edges*

7 *Use the laying-on trowel to trim away any excess undercoat plaster around the edges of the patch and on the surrounding wall area*

it appears above the water and stir with a stick. Once the plaster has settled, add more and keep stirring until the paste reaches the consistency of thick cream.

Whenever you have finished mixing the plaster pour it onto the spot board. Then clean the bucket out immediately, or any remaining traces of plaster will set and then be extremely difficult to chip off. Traces of old plaster in the bucket will also speed up the setting time of subsequently mixed coats.

Applying the floating coat

Mix the floating coat plaster and place it on the spot board. Hold the hawk beneath the overhang of the spot board—if you are right-handed hold the hawk in your left hand and vice versa. Use the laying-on trowel to scrape some plaster onto the hawk then trim away any excess (fig. 2). Tilt the hawk and 'snatch up' a small amount of plaster onto the trowel (fig. 3). Keep the trowel horizontal until the edge connects with the wall, then tilt the outer edge upwards until it is at an angle of about 30° to the wall (fig. 4).

Begin in the centre of the patch and work upwards, exerting slight pressure. Keep the laying-on trowel at an angle, with its upper edge clear of the wall, so that plaster is fed to the wall all the time (fig. 5).

If the patch is 10mm deep or less, fill it until the new plaster is level with the old surrounding plaster. If the patch is more than 10mm deep, do not attempt to fill it in with one coat as this results in the plaster shrinking back from the edges and cracking. Instead, fill the area to half its depth, then use the scratcher to key the plaster with criss-cross lines. Apply a second layer of plaster making the new surface level with the old.

Now, take a straight-edged rule a little longer than the patch and, working from the bottom upwards, draw the rule from side to side over the plaster to make it flush with the edges (fig. 6). Fill in any hollows with more plaster and draw the rule over the surface again.

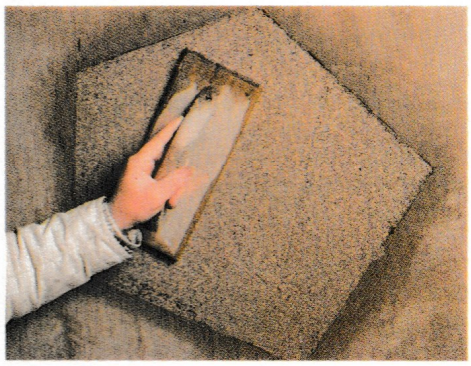
To make room for the finishing coat, the plaster must now be cut back to a depth of 2mm lower than the surrounding plaster if you are using lightweight plaster, or 3mm on other plasters. First, flatten and cut back the floating coat with the skimming float (fig. 8). Next, run the scratcher over the surface of the floating coat to provide a key for the finishing coat (fig. 10). Then, go over the plaster with the skimming float again to flatten the burrs left by the scratcher. The scratch marks should remain but their edges should not protrude too far.

Clean the surrounding wall area to remove any adhering plaster and leave the floating coat to set. Ready-mixed plasters take between 1½ and 3 hours to set. A cement, lime and sand mix takes 24 hours.

Before mixing your finishing coat, clean all tools and the spot board.

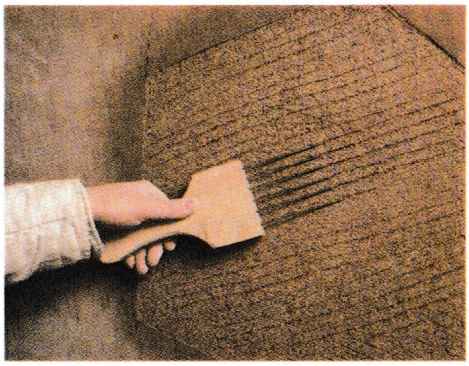
Applying the finishing coat

Once the floating coat has set, mix the finishing plaster to a creamy consistency and place it on the spot board. Scrape some plaster onto the hawk and transfer a small amount to the

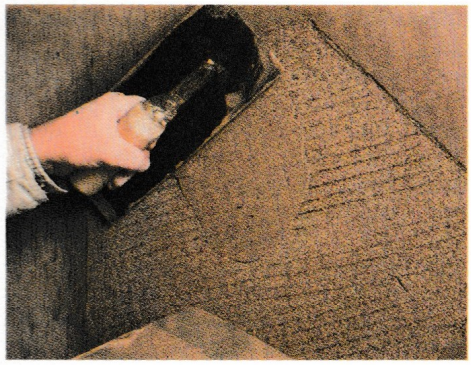


8 *To make room for the final coat of plaster, run over the surface of the undercoat using the skimming float to flatten and cut it back*

9 *Draw the straight-edge across the patch once more to check that the undercoat surface is level and lower than the surrounding plaster*



10 *Run the scratcher lightly across undercoat surface to form ridges. This keys the surface, ensuring that the finishing plaster adheres*



11 *Mix up the finishing plaster and apply it to the patch using the laying-on trowel. Use firm pressure and upward strokes*

12 *As the finishing plaster begins to set, dampen it slightly with the distemper brush. Take care not to use too much water at this point*

13 *Wet the laying-on trowel and smooth it over the surface in circular movements. Finish off with light, upward strokes*

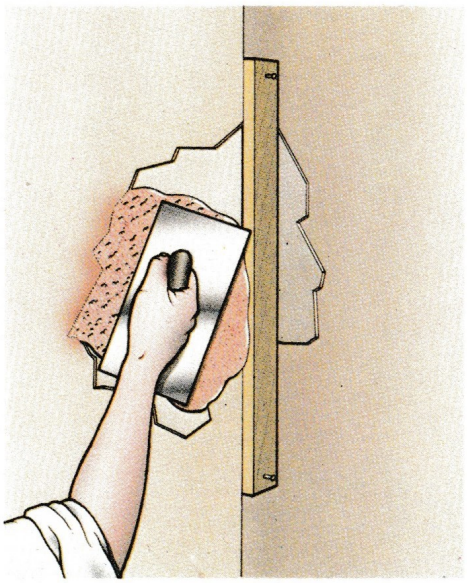
laying-on trowel. Use firm pressure to apply the plaster, using upward strokes as much as possible (fig. 11).

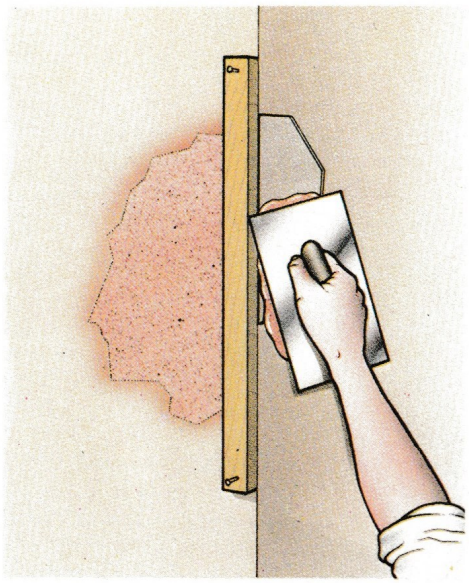
When the finishing coat is level with the existing plaster at the edges, draw the straight-edge over it until it is flush, filling in any hollows. As the plaster begins to set, dampen it with the distemper brush (fig. 12), paying particular attention to the edges where water is quickly absorbed out of the new plaster by the old. Do not use too much water as this can kill the gypsum plaster in the surface and cause crazing. Wet the laying-on trowel and run it over the surface in circular movements, finishing off with light upward strokes (fig. 13).

If you are using sanded plaster, the finishing coat should be applied with the skimming float and the coat should be built up in thin layers. However, use the laying-on trowel for finishing.

Patching corners

If a patch extends around an external corner, nail a batten with a smooth, straight edge to one side of the corner so that its edge is level with the existing plaster on the other side. Plaster up to the corner so that the new plaster is flush with the edge of the batten. When the plaster is dry, remove the batten and repeat the operation for the other side of the corner.



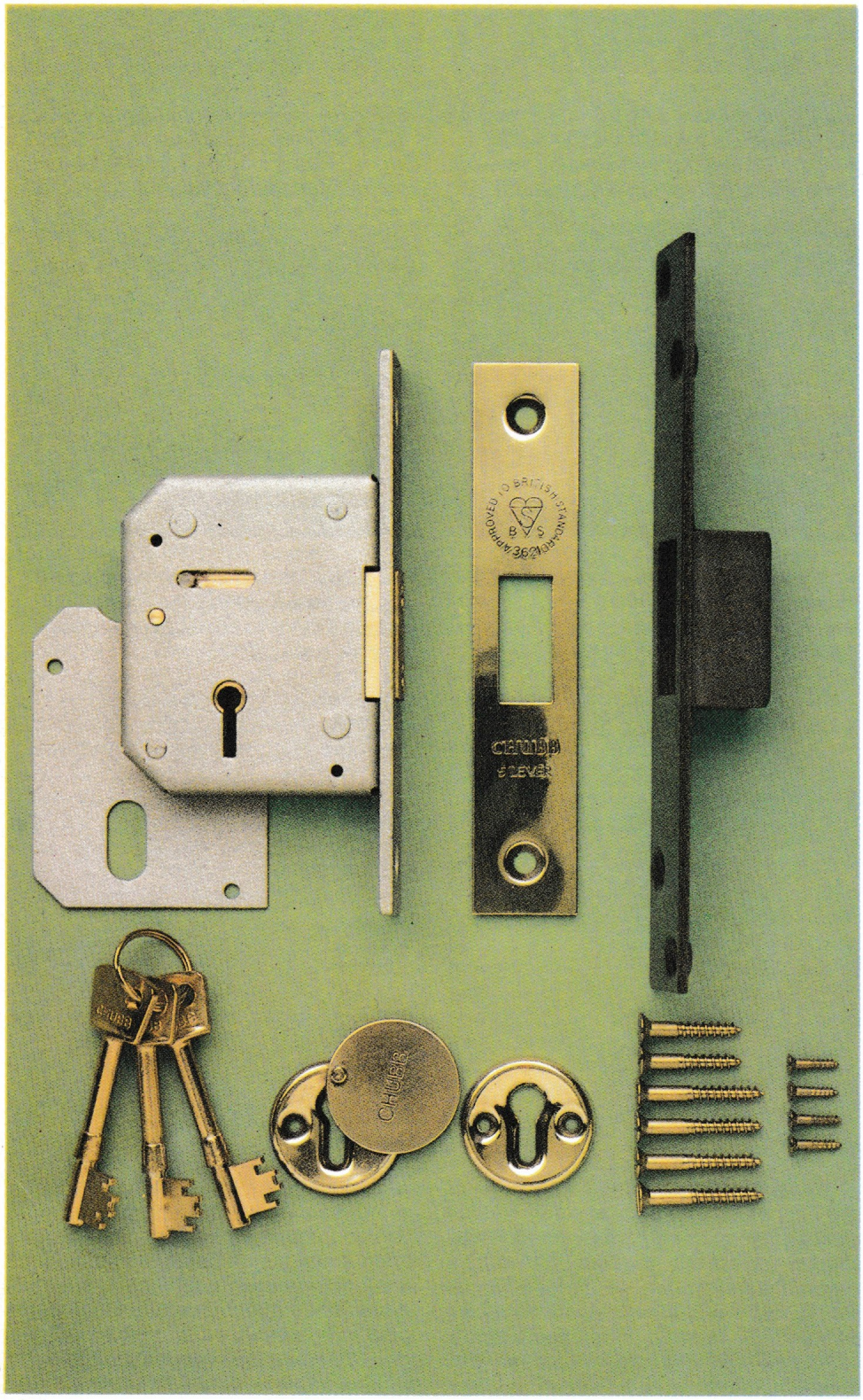


Bernard Fallon

Above left: *If a patch extends round a corner, nail a thin piece of batten to one side of the corner and plaster up to it.* **Above:** *Remove the batten and pin it to the replastered edge. You are then ready to replaster the other side*

Simple security

The rules for securing your home against unwelcome intruders are quite simple. Make it difficult for the criminal to break in and he will go and look for easier pickings elsewhere



Nigel Messett

According to the police, burglars fall into three basic categories. The professional thief who knows what he is after—valuables like antiques, jewellery, paintings and cash—likes to work quickly and cleanly.

The spur of the moment sneak thief is the one who grabs at the chance of stealing ready cash and any easily transportable valuables if he sees a housewife pop next-door and leave the door open.

The third category is the young vandal, bent on causing as much damage as possible, who rips out telephone wires, slashes furniture and breaks everything he can lay his hands on.

Strong security locks on the doors and windows will deter the last two categories. Professional burglars are more difficult to stop, but if your house is going to be very difficult to break into, they will usually decide to try elsewhere.

Securing doors

Most front doors are fitted with a nightlatch, which normally presents little trouble for a thief. A far more effective deterrent is a mortise deadlock. The bolt on this is fixed dead when locked and cannot be sprung back like an ordinary nightlatch.

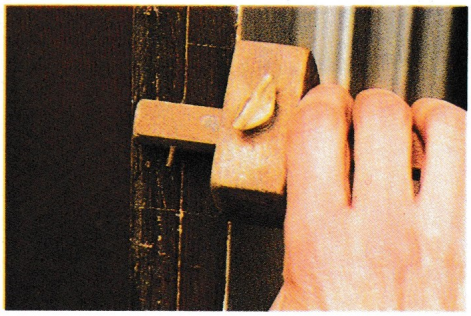
Mortise locks come in a wide range of shapes and sizes but not all are of a guaranteed quality. You should therefore always buy your locks from a reputable firm which specializes in home security.

A good quality mortise lock is designed to be stronger than any wooden door into which it is likely to be fitted. This means that the woodwork would fail before the lock itself. When it is locked, the bolt is enclosed in a steel box protecting the head of the bolt against possible attack from a jemmy or similar tool.

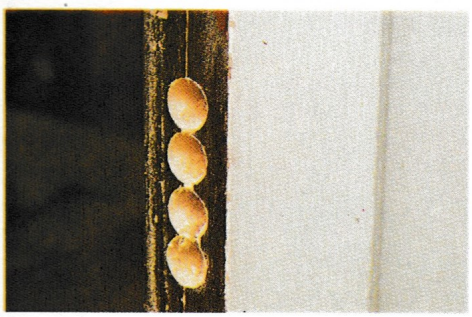
Good security locks cannot be opened with skeleton keys and it is virtually impossible to pick them as they incorporate an anti-picking device. The deadbolts are reinforced to frustrate any attempt to cut right through the bolt.

Left: *All you need to make a door burglar-proof. A mortise lock provides an effective deterrent to most burglars, being so hard to force, or pick open. Fitting one is a fairly simple procedure—you will need a drill, chisel, padsaw and screwdriver*

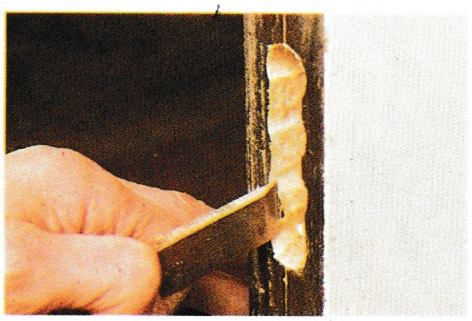
1 *Use the lock body as a template to mark the position of the hole in the edge of the door. Follow the same procedure on the sides*



2 *With a marking gauge set to half the thickness of the door, scribe a line down the door edge to mark the positions of the drill holes*



3 *The drill holes should run almost together along the centre line on the door edge. This leaves you with a minimum of chiselling work*



4 *Use the chisel carefully, paring away only a small amount of wood at a time. Open out the holes into a perfect rectangle*

Fitting a mortise lock

When you buy a mortise lock you are supplied with several parts that have to be assembled in a certain order. The parts include the main lock body —inset into the edge of the door— a plate that is screwed over this to hold it in place, a striking plate and box that fits into the outer frame, screws, keys, and the keyhole covers.

Marking the position

The mortise lock can be placed at any height on the door, though a central position will obviously give the strongest fastening. When you have decided where to place it, take the lock body and use it as a template to mark the width and depth on both sides of the door. Remember that the facing piece of the lock is sunk approximately 6mm into the door so that the cover plate is flush with the surface of the edge.

Use a try-square to mark the width of the lock body on the edge of the door. Then, with a marking gauge, score a line down this width—to fall exactly in the middle of the depth of the door (fig. 2).

To make the hole for the mortise lock, drill, then chisel flat, four holes in the edge of the door. For this, you need a 19mm wood drill bit and a 19mm wood chisel. Wrap a short length of masking tape round the drill bit at the depth of the hole you require. When the holes are drilled, pare away the excess wood with the chisel, removing only small pieces at a time. Work progressively through the hole, making sure that the back surface is absolutely flat to avoid fitting problems later (figs 3 and 4).

Chiselling out the rebate

Your next job is to chisel out the area into which the facing piece of the lock is inserted. A quick and easy way of doing this is to screw the cover plate in place and score carefully round it with a handyman's knife. In this way it is effectively being used as a template.

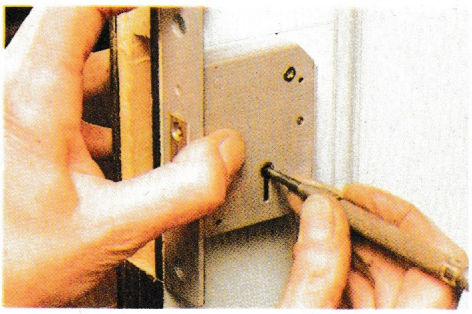
Unscrew and remove the plate then chisel out the area within the lines you have cut. You will probably find that you can score deeply enough with the knife to attain the depth of 6mm that you require. The neatness and accuracy of this chiselling is very much a matter of sleight of hand and eye, but be careful not to cut too vigorously or you may go too deep. When you have finished try the lock body and the cover plate in position and make sure that the latter is level with the surface of the door edge.

Cutting the key-holes

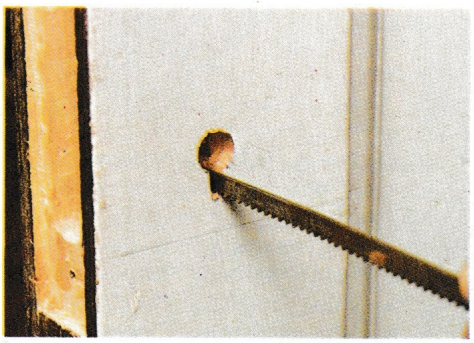
Hold the lock body in position against the lines you have marked on the side of the door then mark a central point for the key-hole by placing a scriber or small drill bit through it (fig. 5). Repeat this operation on the other side. You then require a 12mm drill bit to bore two holes through to the centre from either side of the door. You will be able to determine, with your particular key, the length of the downward cut that you need to make for the key shape. Cut out this shape with a padsaw (fig. 6). Again make sure that you do this on both sides.

Now you can place the mortise lock back into position and screw on the cover plate. Your last task on this part of the door is to fix the key-hole covers on to the holes you have cut in the sides. You are provided with two covers, one with swivelling plate attached and one without. The swivel attachment is for the prevention of draughts and is therefore fixed on the inside of the door.

Mark the screw holes for these covers with the key comfortably set in the turning position. If you do not do it this way you may find you have key-fitting problems after the cover has been screwed in place.



5 *Having chiselled out the rebate for the facing plate around the hole, use the lock body again to help mark the position of the keyhole*

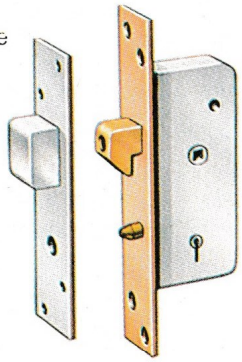


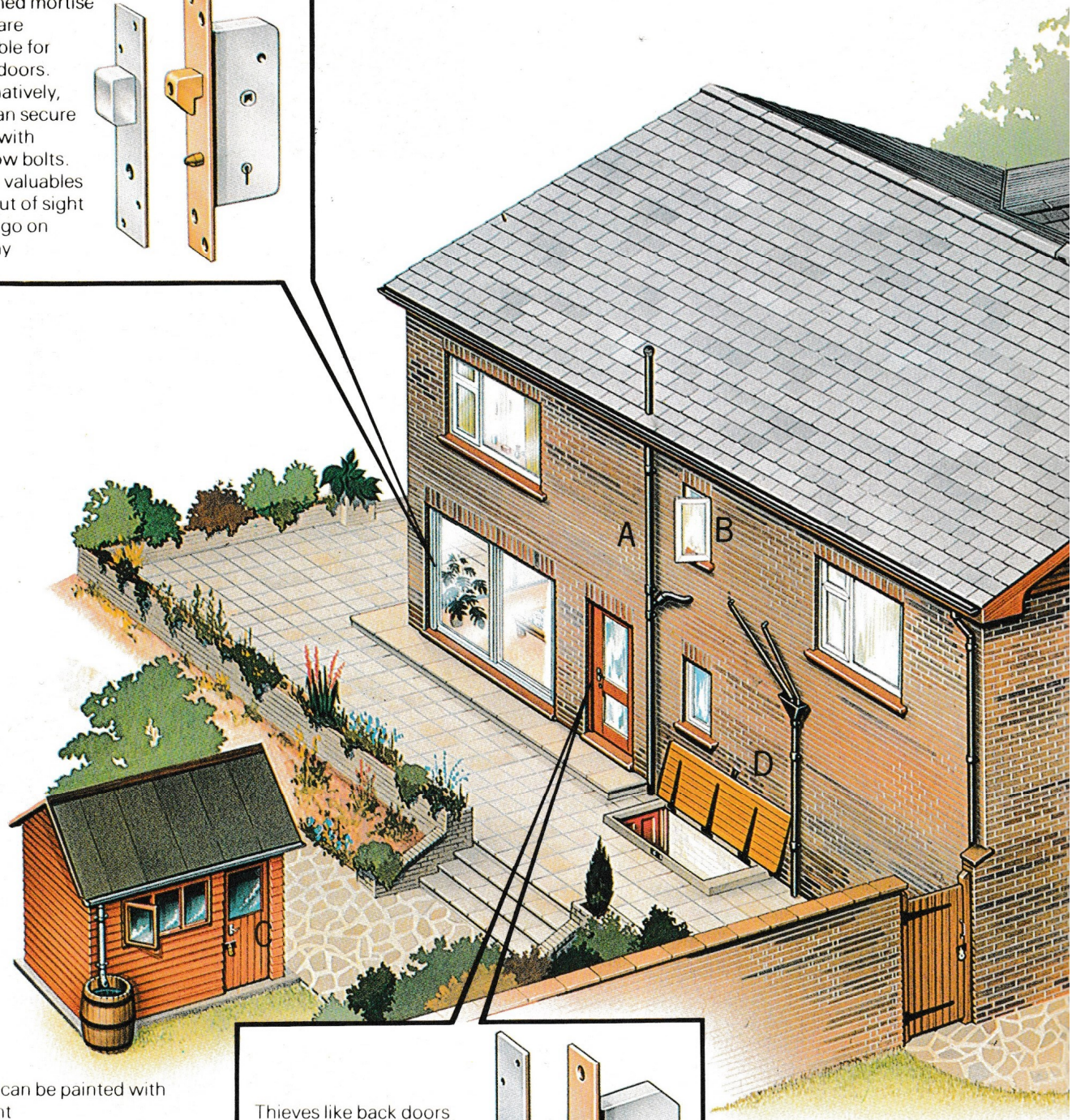
Nelson Hargreaves

6 *Form the cut-out section of the keyhole with a padsaw. Check the key for fit from both sides before you install the lock body*

Your house – the weak points

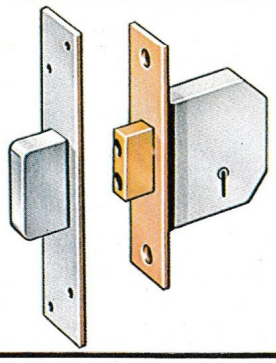
Specially designed mortise locks are available for patio doors. Alternatively, you can secure them with window bolts. Leave valuables well out of sight if you go on holiday

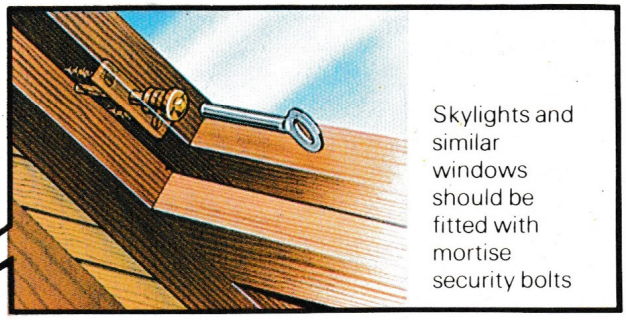




A Downpipes can be painted with anti-climb paint
B Small windows should not be ignored – thieves often use small children to climb through them
C Remember to padlock sheds and outhouses – some thieves specialize in stealing garden equipment and fuel
D Make sure that basement doors and windows are secure – thieves can work comfortably out of sight there

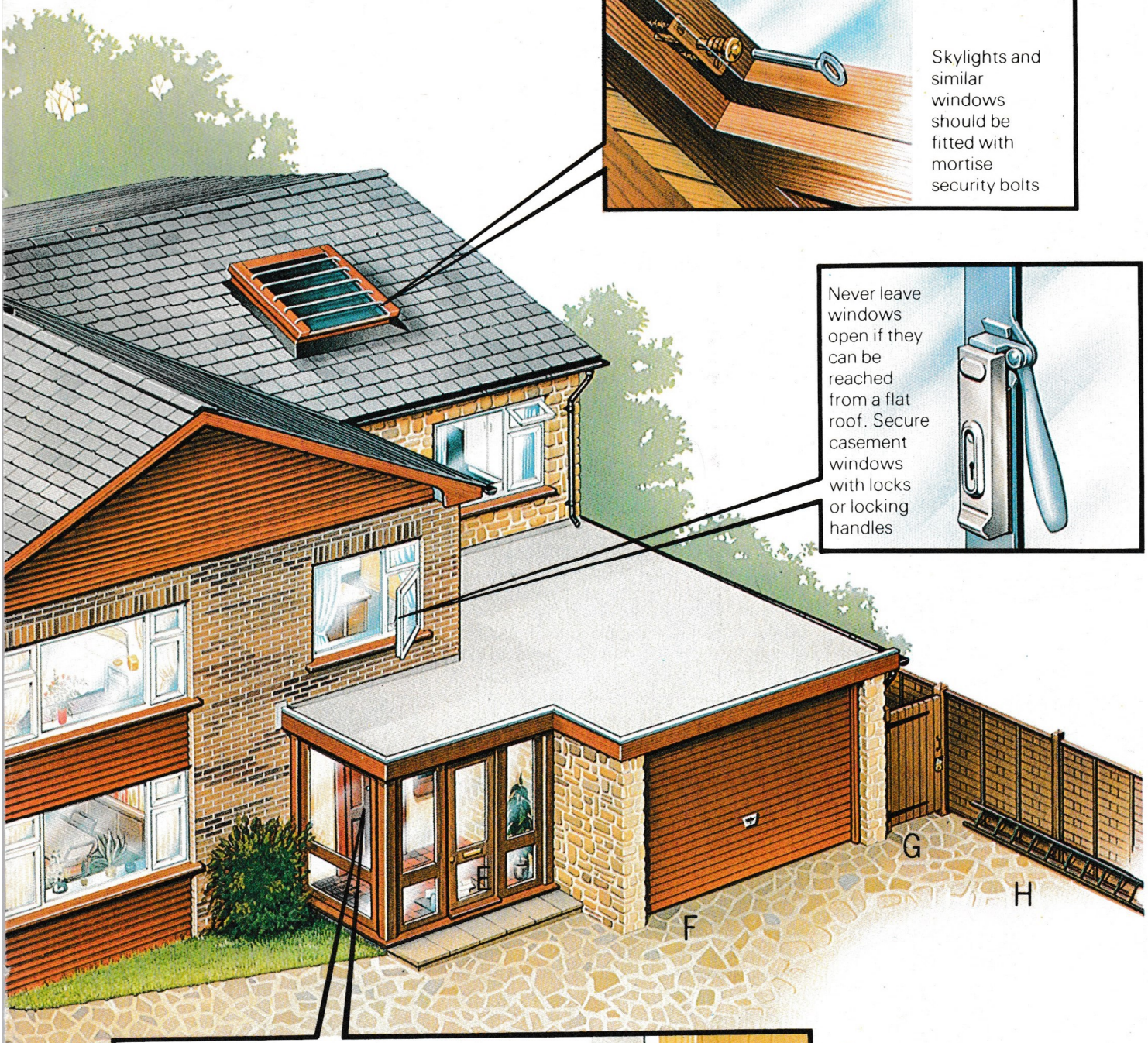
Thieves like back doors because they often have easily overcome locks. Secure them with a No. 3 or a No. 5 lever mortise deadlock

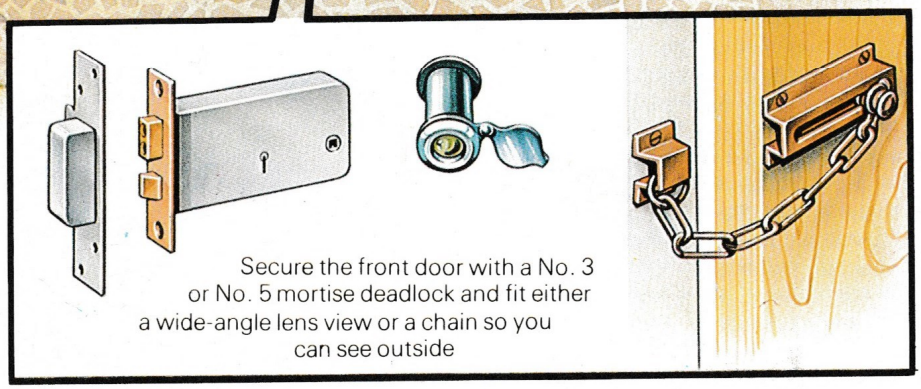




Skylights and similar windows should be fitted with mortise security bolts

Never leave windows open if they can be reached from a flat roof. Secure casement windows with locks or locking handles





Secure the front door with a No. 3 or No. 5 mortise deadlock and fit either a wide-angle lens view or a chain so you can see outside

E Never have a letter box on a porch door – thieves will be able to tell you are away. Have the letter box on the front door and leave the porch door open

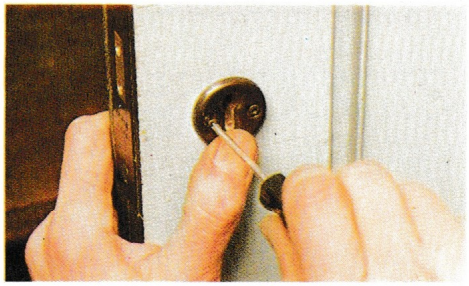
F Never leave garage doors unlocked – thieves can enter unseen and remove bricks to get into the house

G Secure high gates with strong bolts or padlocks

H Never leave ladders lying around to tempt the burglar

Venner Artists

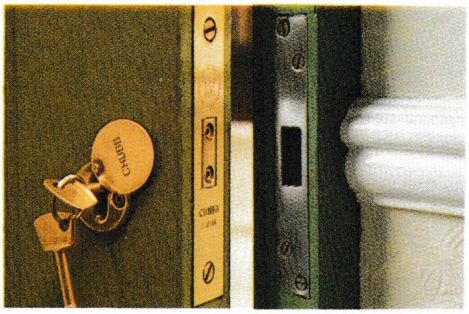
7 *Having located the lock body in position and made any necessary adjustments to the depth of the rebate, screw on the cover plate*



8 *The only work left on the door itself is to fix the keyhole covers. Make sure the one with the draught cover goes on the inside*

9 *With the lock closed and held against the door frame, you can mark the depth of the striking plate rebate and bolt box*

10 *Cut out the hole for the bolt box and striking plate in the frame. Before securing the plate, make sure that the door will close properly*



11 *Both sides of the finished lock. The design is such that the woodwork around the door will fail before the lock itself*

12 *Key-operated casement window locks are simple security devices. To fit, first secure the shaft plate to the casement*

Fitting the striking plate

All that now remains is to fit the striking plate and bolt box on to the door frame. The method of making the rebate is much the same here as it is on the door, except that less work is involved as the hole is considerably smaller and shallower.

To mark the position of the rebate turn the key in the mortise lock so that the bolt protrudes in its locked position. Then close the door and, using the bolt as a template, draw lines either side of it on the side of the door frame. Remember that the box that houses the bolt is wider than the bolt itself so allow at least 3mm on either side of the bolt's width when you run these lines on to the inside of the door frame.

Next you must measure the length from the edge to the centre of the bolt on the lock body and translate this length on to the door frame, again using a marking gauge to scribe a central line on the wood.

It now remains to drill, as before, the box hole with two consecutively-placed holes (or three at the most) using the 19mm drill bit. This done, chisel and pare away the excess wood until the finished hole is formed.

It may not be necessary to make the striking plate flush with the level of the door frame's surface—it depends on how tightly the door fits in the frame. If it is a very close fit you must repeat the operation of screwing the plate into position, scoring round it and chiselling out a recess. If there is a gap where the door meets the frame, simply screw the striking plate into position. It is possible, however, that the screw holes on the striking plate are *plunged*—punched into a slight bowl-shaped recess—and you may have to countersink the holes in the door frame slightly.

Securing windows

Although the glass in windows always makes them vulnerable to straightforward breakage, an intruder will always search for a quieter method of entry first. Like the nightlatches on doors, most conventional window catches are surprisingly easy to force, so you need some extra security devices to act as a deterrent.

A number of lockable window catches are available, to suit all shapes and sizes of window. Figs 12 to 14 show how to fit one of these.

Once in place, window locks should deter all but the boldest intruder. But for the sake of safety in the event of a fire and for your own convenience, remember to leave the keys near the window. Choose an accessible site, out of a burglar's vision.

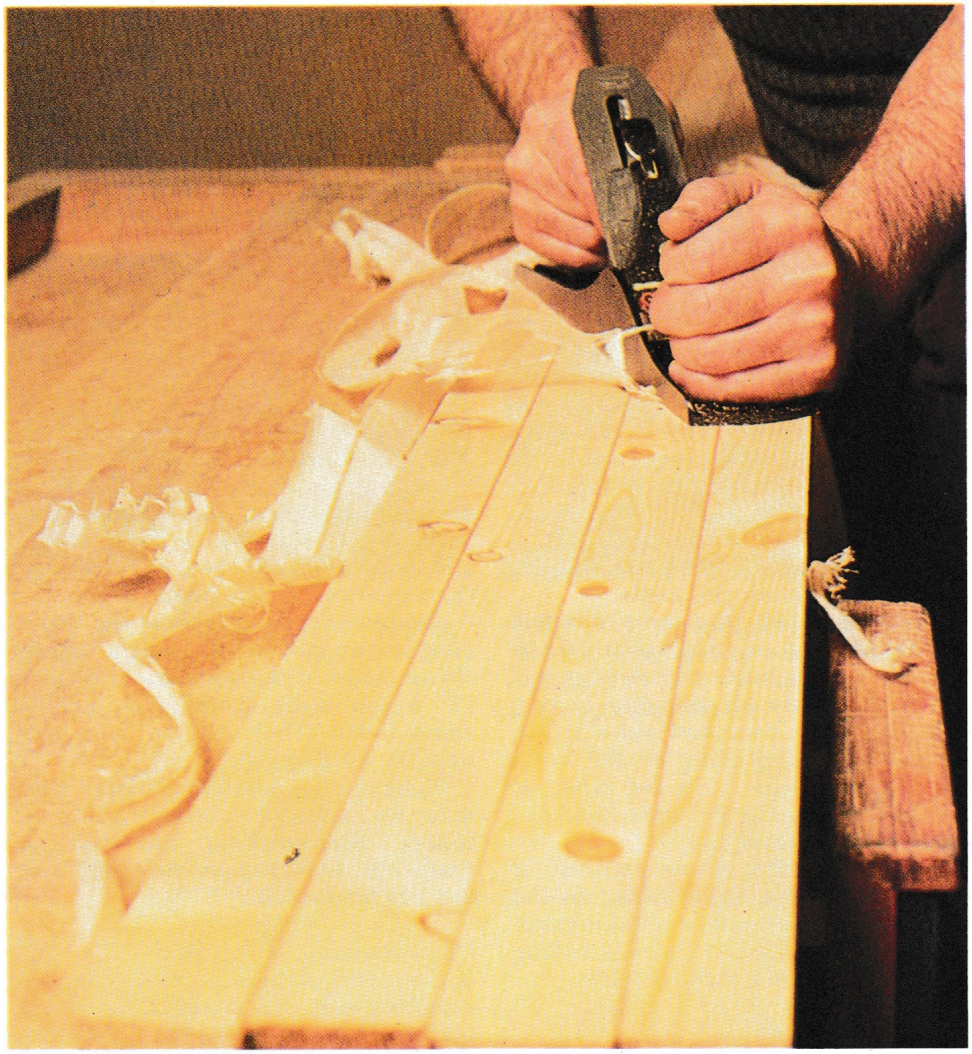
13 *The next step is to secure the locking plate on the window frame, making sure that it fits comfortably over the shaft plate*

Nelson Hargreaves

14 *The window lock has a threaded barrel which screws onto the shaft plate. The barrel can be removed only with a special key*

The art of planing

Bench and block planes ● Care of the blade ● Taking apart and re-assembling ● Preparing the wood ● How to hold the plane properly ● Using the plane ● Planing end grain



Below: *A fairly long plane used for long pieces of wood so the plane levels out the timber rather than following any profile it might have. The plane is held comfortably with the body weight over the top of it*

A plane's job is to slice off unwanted portions of wood, reducing the wood to the exact size required and leaving it smooth and flat.

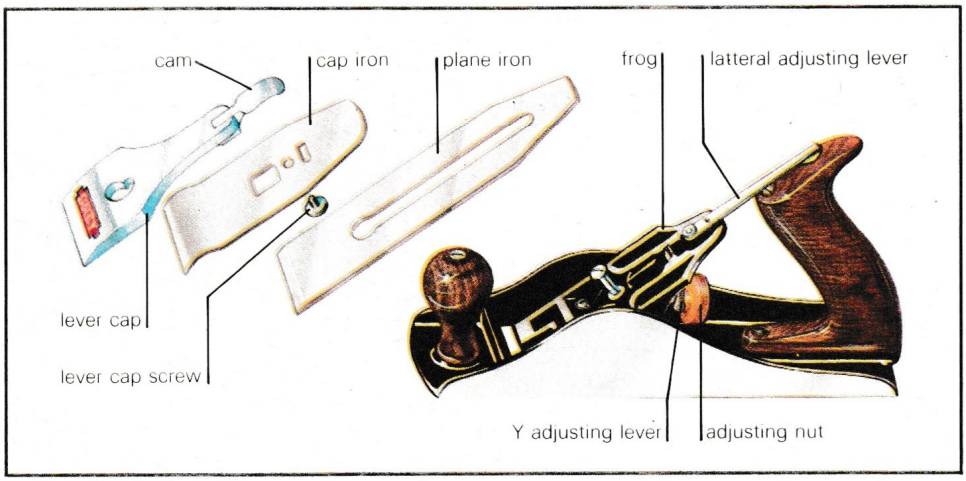
There are a variety of planes for different jobs but the most commonly used are the bench and block planes.

Bench planes

These are made up of the same parts and have the same adjusting and sharpening procedures. They come in four lengths. The jointer plane is the longest, measuring approximately 550mm, the fore plane is about 450mm, the jack plane is 350-375mm and the smooth plane 200-250mm.

A long plane cuts flatter than a small one because the short one rides the bumps instead of just straddling them. The jack is good for straightening up and levelling pre-finished timber of any length. The jointer plane is used for getting a deadlevel, straight surface, especially on long, narrow pieces of wood.

The plane blade has two angles forming the cutting edge—the ground angle of 25° and the honed angle of 30°. The plane's ground angle is already formed on a new plane and will need only occasional renewing on a grinding stone but the honed angle has to be sharpened before you can use the plane. If the blade is not sharp it will tear the surface of the wood making it unsightly and sometimes completely unusable.



David Watson

Taking apart and sharpening

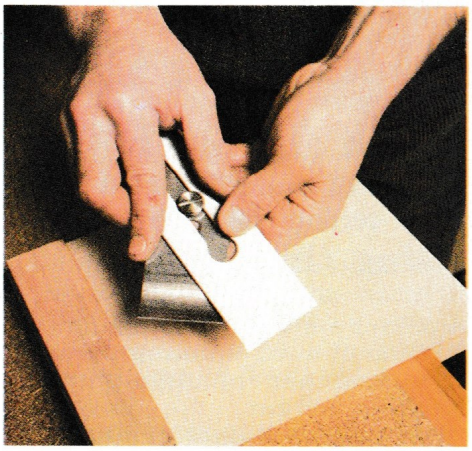
Referring to the diagram on the left remove the lever cap by releasing the cam and sliding the cap upwards until it will lift off. Remove the plane blade and the cap iron. Place them on a flat surface and undo the cap iron screw. Slide the blade forward, twist it through 90° and remove from the cap iron.

If you have a honing guide for sharpening the blade, set this up according to the manufacturer's instructions. Alternatively, use an oil

Left: *A new plane is easily taken apart for sharpening the blade*

1 *Moisten the stone with oil. Tilt the iron to a 30° angle and then rub the blade evenly up and down the stone maintaining that angle*

2 *When the blade is burred on the flat side turn it over and place it flat on the stone. Move up and down at a slight angle to remove burr*



3 *Hold the cap iron, screw side up, and place the blade at 90° to the screw. Slide the blade so the screw moves up the slot and twist*

stone box with a medium stone.

Use enough oil to keep the surface of the stone moist. Hold the plane iron so the blade is at 90° to the stone with the bevel side of the blade down on the stone. Tilt the iron until you feel the bevel flat on the stone—this will be about a 25° angle. Tilt through another 5° to get a 30° angle. Then rub the blade evenly up and down the stone, maintaining the angle.

Continue doing this until you feel a burr or wire (a roughness) on the flat side of the blade. When you feel it burred evenly all the way across, turn the blade over and place it flat on the stone. Holding it flat with both hands, move it up and down at a slight angle until the burr has been removed from the edge.

Repeat on a fine stone and then, if you want a very sharp edge, do the same again on a leather strop impregnated with motor car valve grinding paste to provide a good abrasive.

Re-assembling

To put the plane together again, hold the cap iron screw side up and place the blade at right angles to it over the screw. Slide the blade so that the screw goes three quarters of the way up the slot, then twist it back through 90° and slide it back until only 3mm of blade projects beyond the cap iron.

Finger-tighten the screw and re-adjust the blade to a clearance of 5-7mm. Hold the blade flat on a bench and tighten the screw. Place the blade back on the plane—taking care not to damage the sharpened edge—so that it lies flat on the frog, then replace the lever cap. Look along the bottom of the plane from the front at eye level and move the lateral adjusting lever to the right or left, if the blade is not level.

Block planes

These are very like the bench planes but they are smaller. They are made up of similar parts but there are fewer of them. They have to be taken apart and the blade sharpened in exactly the same way as the bench plane.

The standard type has the same cutting angle as a bench plane. Others have a cutting edge of 20° and 12° which make it easier to use on small items. They can be used one-handed quite easily.

Block planes are particularly suitable for using on small pieces of timber, for working on the end grain of timber and for trimming plastic laminates.

Preparation

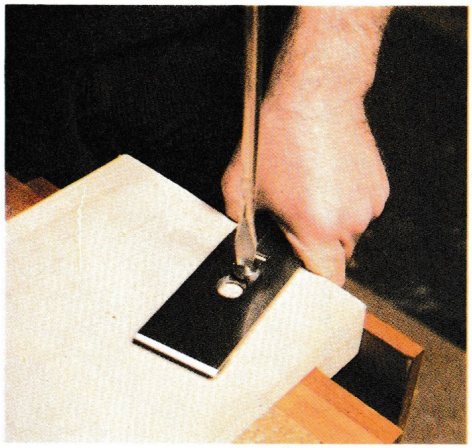
If the wood you are going to plane is covered with old paint it is worth taking this off with paint stripper before you start, otherwise the plane will not be able to bite into the wood. Remove any nails as they would damage the blade.

Put the wood on a solid, level surface so that it will not move while you are planing. Have the end of the wood against a stop.

If you are supporting the workpiece in a vice, make sure that it is sandwiched between two offcuts to prevent the jaws from bruising the wood.

The frog part is adjustable, which means that the mouth of the plane can be altered according to the type of material you are planing. For rough planing and soft timbers, the blade should be set with half to three-

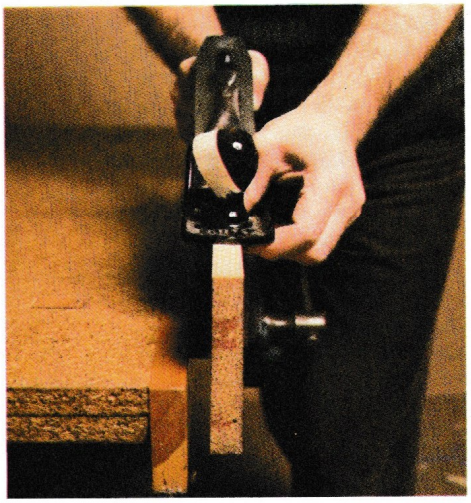
4 *Slide the blade back until 3mm projects beyond the cap iron and then finger-tighten the screw. Then re-adjust blade to show 0.5-0.7mm*



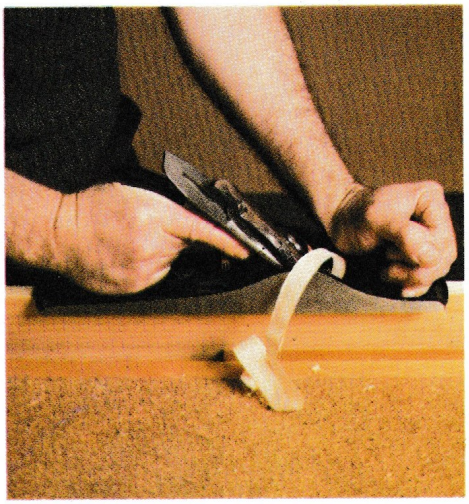
5 *Hold the blade flat on a bench and tighten the screw. Having placed the blade back on the plane, you can replace the lever cap*

6 *Look along the bottom of plane from the front and adjust it until the cutting edge is level and protrudes less than 0.5mm*

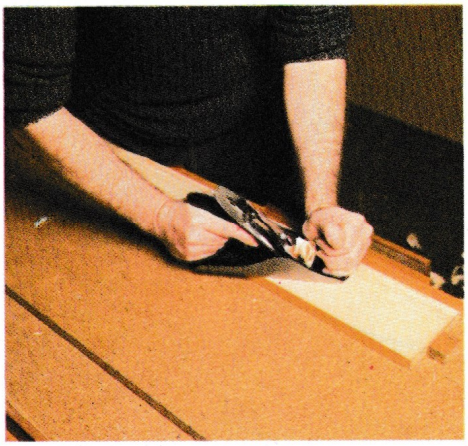
7 *Hold the plane with both hands and with body balanced over the top. Push the plane over the wood, keeping cuts shallow and even*



8 *When planing a long, square edge move your front hand. Use your fingers to support the plane and help keep it in a square position*



9 *If you are planing correctly you should be producing long ribbon-like shavings of equal thickness and width. Do not stop in mid-stroke*



10 *When planing across a wide width of wood twist the plane at an angle to help reduce the resistance of the wood to the plane*

11 *To plane end grain put the wood in a vice with an offcut behind it then plane across both pieces. This avoids splitting*

12 *Alternatively, bevel all the four corners then plane from one end to the middle. Turn over the wood and repeat on the other side*

quarters of the mouth open. For fine finishing of hard woods and for planing end grain, the frog should be adjusted to give a very fine mouth opening of about 1.5mm.

Method

Hold the plane firmly but comfortably with both hands and with your body balanced over the top of the plane. Push the plane forward over the wood keeping the cuts shallow and even. Never plane against the grain of the wood or the blade will catch on the ends of the fibres.

If you are planing correctly you should be producing ribbon-like shavings of equal width and thickness.

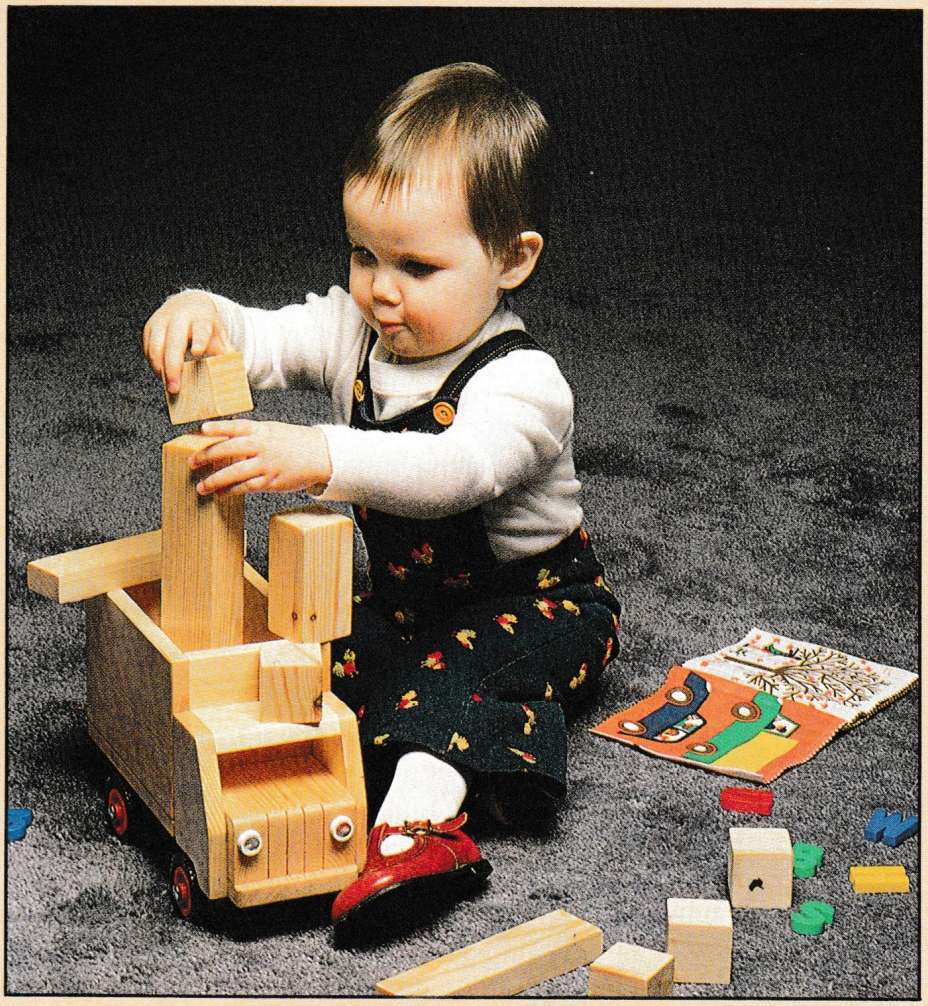
When planing long edges apply more pressure on the front knob of the plane at the beginning of the stroke, even out the pressure in the middle of the stroke and at the end of the stroke apply more pressure at the back of the plane (fig. 10). Make the stroke the whole length of the wood.

End grain

If you are planing end grain, cut the wood 6 mm longer than it needs to be. Put the piece of wood upright in a bench vice, with a waste piece of wood behind. Plane across both pieces of wood—that way any splitting will occur on the waste wood rather than the wood you want to use.

Alternatively, you can bevel all the four corners and then plane from one end towards the middle. Turn the wood around and plane from the other end towards the middle. Remove the piece left in the middle very carefully. The plane needs to be very sharp and finely set for this or you will be left with an uneven surface.

Build a toy truck



Gavin Cochrane

This sturdy wooden truck opens up to reveal a set of lovely smooth bricks that will delight any toddler. It makes an ideal Christmas or birthday present and at the same time allows you to practise your carpentry skills.

The truck and bricks are made from 13mm softwood planed down from 18mm so that there are no sharp edges to hurt small hands.

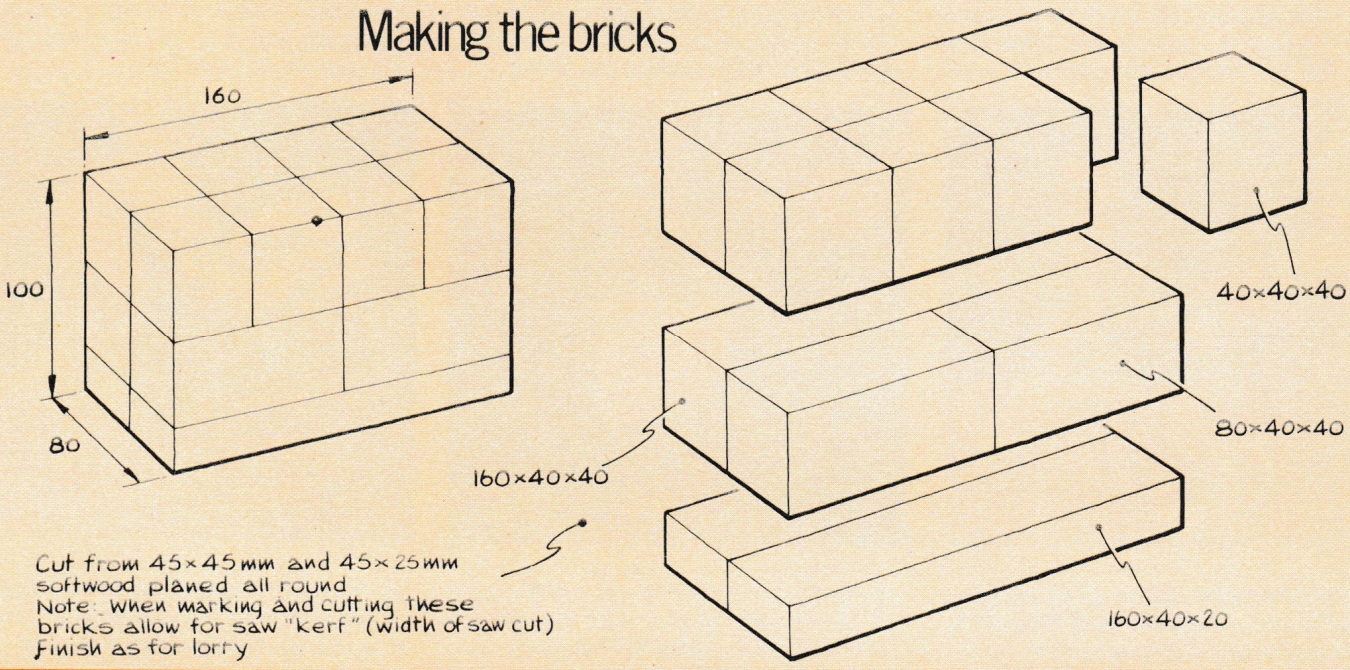
All the joints are either screwed or glued and pinned using a white PVA wood adhesive.

The lid of the truck slips off easily to reveal the nest of bricks inside. The thirteen bricks are fashioned in a variety of shapes and sizes that fit exactly into the back of the truck. There are eight square ones and five long ones in different lengths and widths so that they can be mixed and matched to make different patterns.

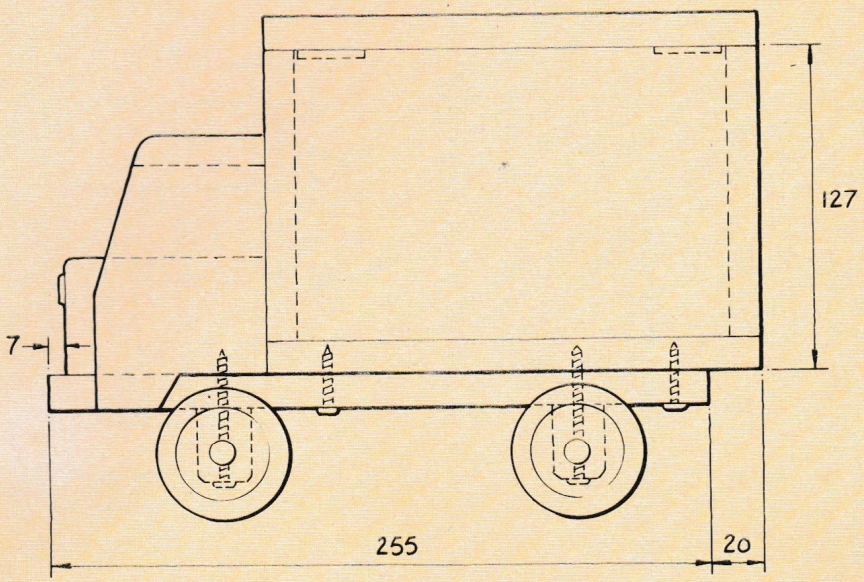
The headlights are made from silvered screw cover caps and the wheels are readily available from toy and model shops and DIY shops.

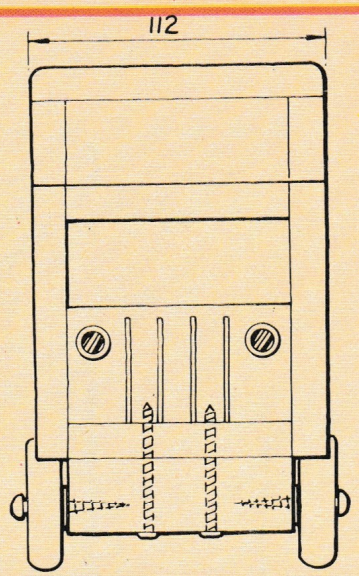
Our featured truck has been finished in natural wood, covered with several coats of hardwearing polyurethane varnish. Where children are concerned this is a more practical finish than paint which tends to chip off after a time. Lightly sanding the wood in between coats will give the truck a really lasting shine and a smooth glossy coat.

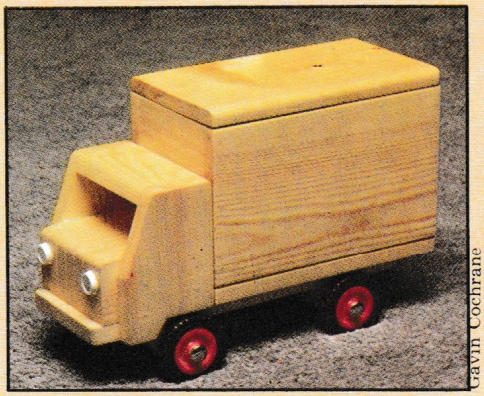
Making the bricks



Cut from 45×45mm and 45×25mm softwood planed all round
Note: when marking and cutting these bricks allow for saw "kerf" (width of saw cut)
Finish as for lorry

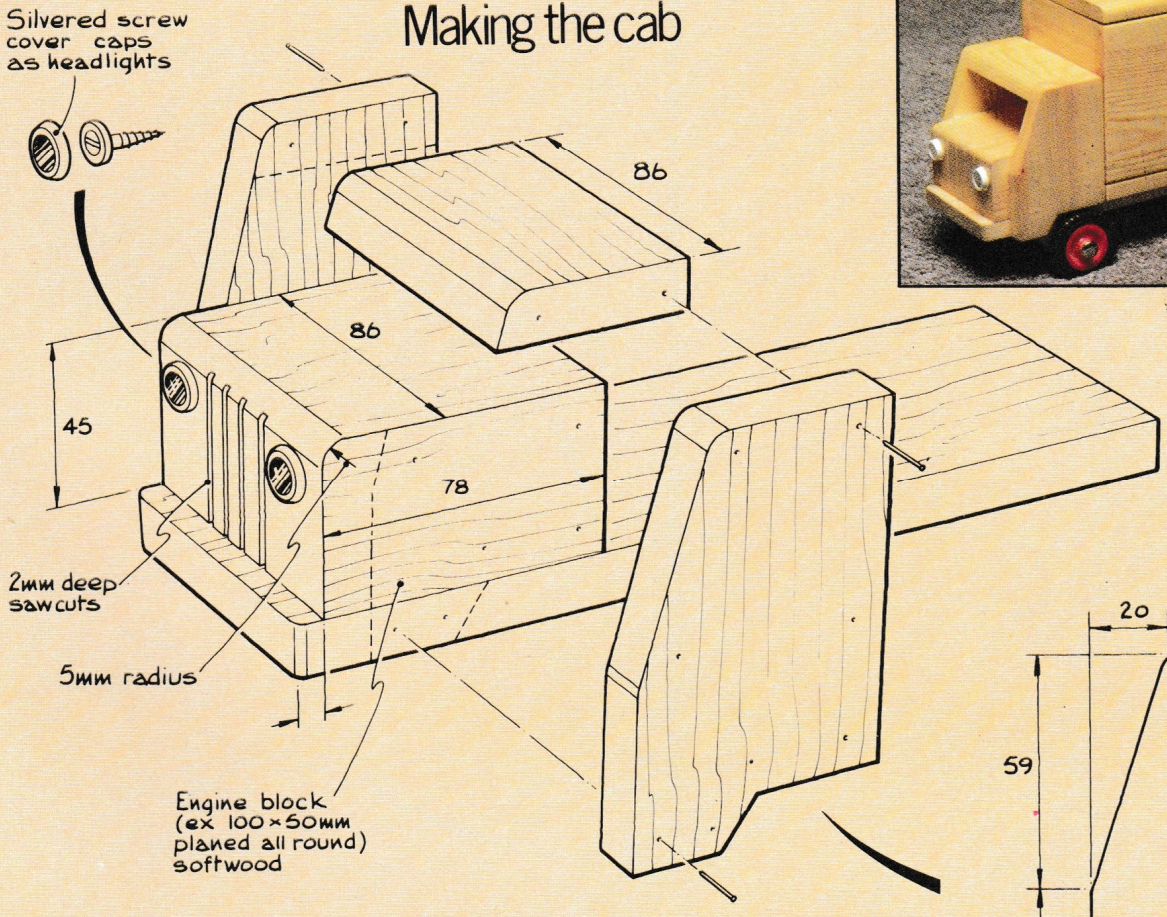


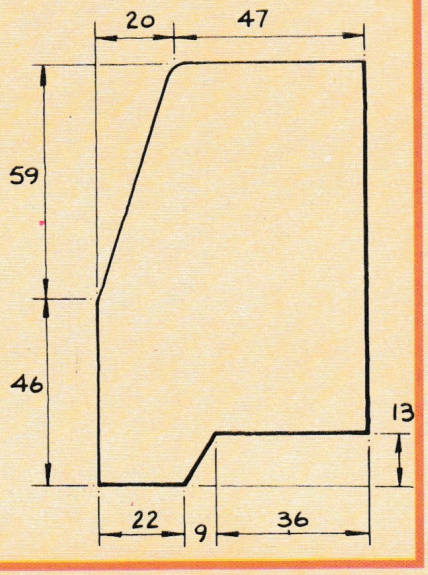




Gavin Cochrane

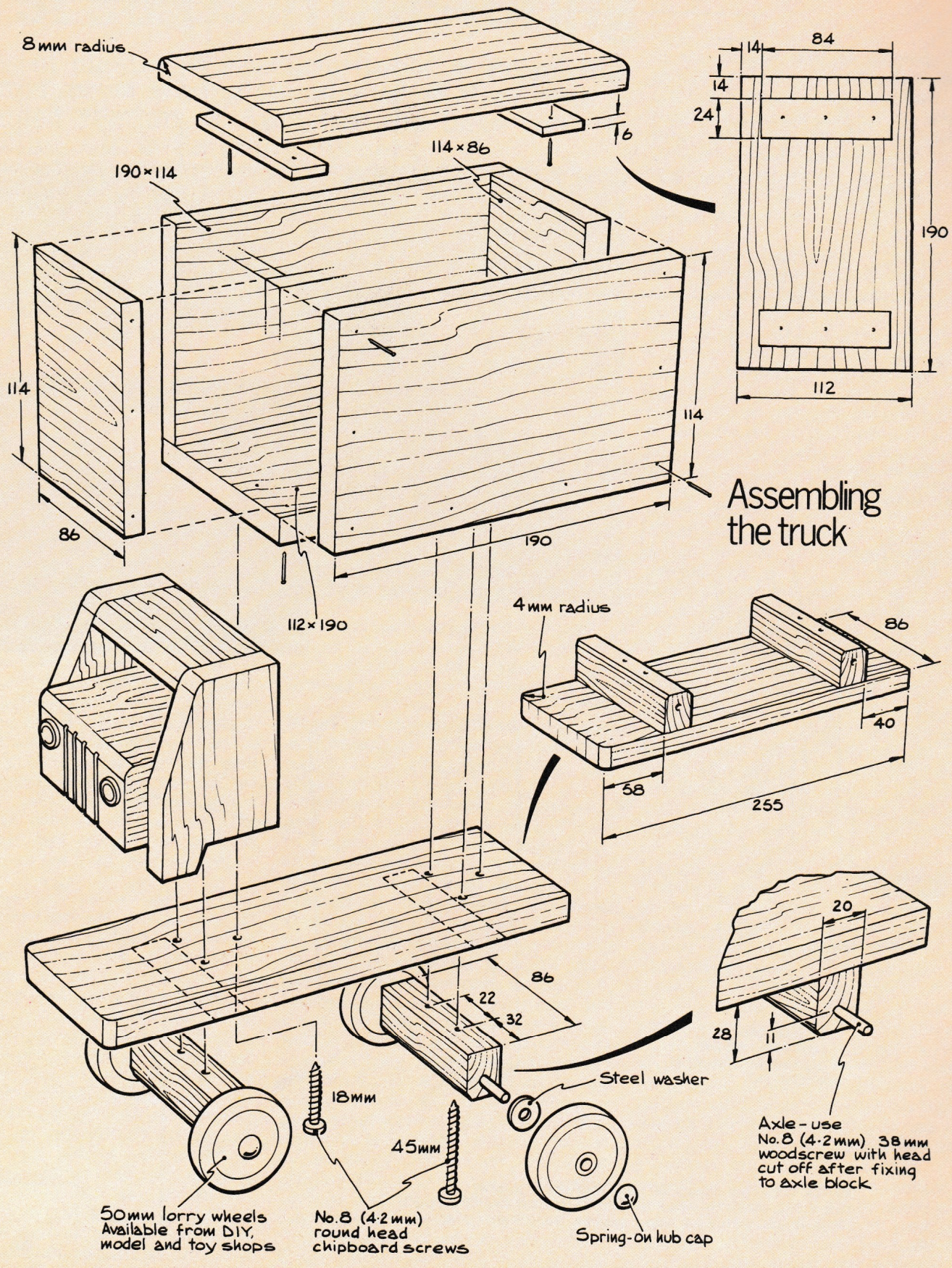
Making the cab





Finish with two coats of polyurethane lacquer, the first coat thinned with 15% white spirit added. Rub down with fine glass paper between coats

Advertising Arts



Advertising Arts

Using a blowlamp

Plumbing jobs that need use of a blowlamp ● Using a blowlamp for soldering ● Making a capillary joint ● Using a swageing tool ● Working with stainless-steel piping ● Installing an outside tap for the garden

Pipe bending and the use of capillary joints are important aspects of plumbing and are not complicated skills. But, because they involve using a blowlamp, less involved methods of shaping and joining copper pipework are often preferred. These alternatives are sometimes less efficient and always more expensive.

There is no difficulty in using a blowlamp, for plumbing or for any other of the household decorating and maintenance jobs where it is needed. But this can be a dangerous piece of equipment and care is required in its use. A blowlamp must always be stored in a well-ventilated place and sensible precautions taken when using it. It is particularly important to make sure that the blowlamp is put down on a stable base between stages.

Types of blowlamp

Blowlamps of various types are available. Some of the larger models are intended for professional use while others are capable of light household tasks only. The disposable cannister gas torch type is probably the most suitable for occasional home plumbing needs because it is light and cheap. A selection of nozzle fittings increases the range of jobs that can be handled by the blowlamp.

A blowlamp is required for two simple jobs in plumbing: *annealing* and *soldering*. Annealing is the term used to describe the process of heating, then cooling metals to remove brittleness and soften them.

Copper piping can be bent to shape without prior heating and cooling but the job is much more efficiently done if the tubing is first annealed. In the case of copper, this is done by heating the pipework slowly to a dull cherry-red glow and then plunging it in water to cool it rapidly. You need anneal only the section of pipe used to form the bend. If the area to be annealed is in the middle of a long length of pipe, water may be poured over the work to cool it.

At little extra cost you can buy piping that has already been annealed —ask for 'half-hard' tube—but as the process is very straightforward it is easy enough to do the job yourself, on whatever piping you normally use and just where a bend is wanted.

Using a blowlamp

When you can work away from a confined pipe run, do so. The work is much easier. Clamp the workpiece to a workbench, or otherwise support it. Or you may prefer to do the soldering over a blowlamp fixed firmly in a workbench clamp. But you need gloves for holding the pipework—copper is a particularly good conductor of heat—and you should work with the flame going away from you (see below). One hand can be used to hold and rotate the pipe and fitting and the other used for applying the solder.

Adjust the blowlamp to give a controllable flame, concentrated as finely as possible. This simplifies the soldering operation and minimizes the need for masking behind the area of work. You may often have to use a blowlamp in tight corners, and masking off behind the work area shields the background to the pipework from the flame. You can use a few old ceramic tiles for this. A better solution, however, is to use purpose-made asbestos or glass-fibre cloth or matting.

You must avoid running the flame on sheet asbestos or plasterboard fixed in place behind pipework—but off-cuts of soft asbestos board may be used as shielding. Great care must also be taken to avoid damaging paintwork or glass close to the work. Blowlamps should not be used on plastic piping.

Some blowlamps have a flame shield accessory that slips in place behind the area of work. Being attached to the blowlamp, this has the advantage of leaving a hand free for soldering. Keeping hands clear of the flame is an obvious precaution all too easily—and painfully—overlooked when work-

Below: *To prevent injury, make sure the blowtorch flame always points away from you and wear gloves*

ing with the near-invisible flame of a blowlamp. Heavy-duty, heat-resistant gloves are an essential precaution against personal injury from flame or hot metal. On no account should you wear rubberized, or synthetic fibre gloves as these could melt onto your skin and cause severe burns.

For pipe bending and joining, always heat the general area of work with the end flame before coming in with the hottest, central, part of the flame. Play this inner flame on the precise area of the bend or join until the copper is glowing, for annealing, or at the soldering temperature.

In soldering, it is the heated metal that melts the solder—not the blowlamp—so if the solder does not melt, the joint area is not hot enough. In soft-soldering, remove the blowlamp as the solder is melting.

Soldering copper

Soldering is the joining of metal to metal by melting between them a metal alloy called *solder*. In plumbing, soldering is normally associated with pipe joining.

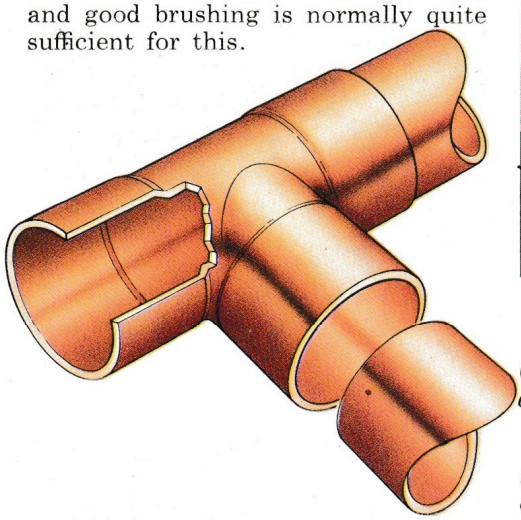
Soldering alloys fall into two groups: soft solders, and hard solders. A simple explanation of the difference is that soft-soldering does not require high melting temperatures, but the use of a 'weaker' alloy for joining means that this method is suitable only for joints subjected to light loads. Nearly all plumbing jobs fall within this category.

Hard solders melt at very high temperatures and, being stronger alloys, are suitable for larger and more loaded joints. In plumbing only heavy-duty pressure pipes are ever likely to require hard-soldering (called 'brazing')—this is a job for a professional plumber.

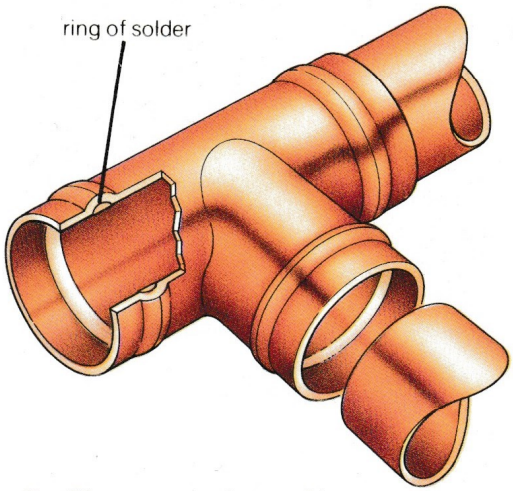
Very much part of the soldering operation is the application of *flux* to the cleaned surfaces of a joint. Flux is a chemical compound which first cleans the joint surfaces, and then protects these from oxides that form while heating, ensuring a good strong bond of metal and solder. Always use a clean brush or piece of wood or card as a spatula when applying the flux, to prevent skin irritation and mess.

Two basic types of flux are used in soft-soldering applications, and each is available in either liquid or paste form. Both can be used for soft-soldering copper piping joints.

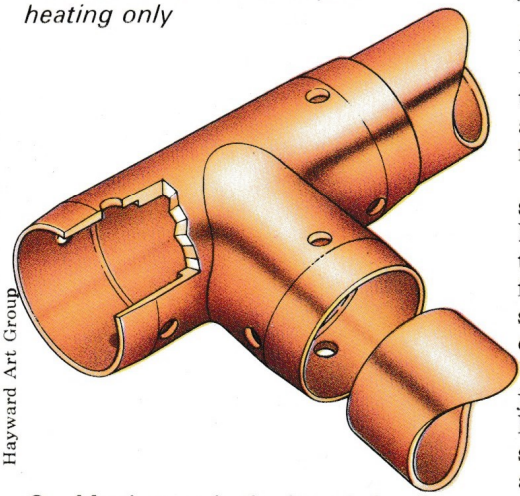
Mild, non-corrosive flux usually employs a resin base. It is particularly suitable where it is not possible to 'clean up' the joint area after soldering, as a non-corrosive residue remains. *Acid corrosive flux* is a more energetic form that rapidly dissolves oxides, but leaves a corrosive residue which must be removed—soapy water and good brushing is normally quite sufficient for this.



A. *This is an 'end feed' capillary 'T' joint—a ready made expanded joint*



B. *The commonly used 'pre-soldered' version that requires heating only*



C. *Much rarer is the 'touch feed' type—solder is melted in the hole*

Hayward Art Group

1 *Burnish the outside of the pipe and the inside of the fitting (here a pre-soldered 'T' joint) to ensure a good solder bond*

For soldering, you can use resin or acid cored solder where the flux is contained within the solder wire itself—but for plumbing only in addition to liquid or paste flux which is spread liberally on the joint surfaces. The fluxed solder does help, though.

Capillary joints

Even though a capillary joint requires a little extra time in pipe preparation it is cheaper, neater and often more efficient than a compression joint as a means of joining copper piping. It is a joint that can be used and fitted in the tightest of places.

The join is a metal-to-metal bond of copper and solder, used for permanent joins. It is possible to 'break down' an old or unwanted capillary joint and re-use the fitting, but if any flexibility is required in a pipework system, which is unusual, it is better to make use of a suitable compression joint instead. (See pages 50-55.)

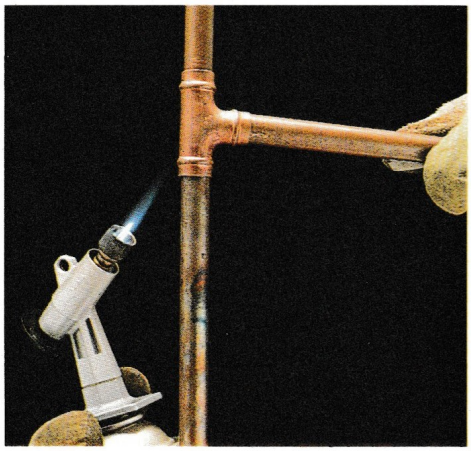
There are three types of capillary fitting. All rely on the same principle—the capillary action which draws the bonding material (molten solder) along the minute gap between the fitting and the pipe between.

In one type, the fitting is pre-soldered and requires little more than heating when joining. You can see the solder ring inside one of these fittings. The other two types require solder to be applied either at the rim edge of the assembled joint or at 'touch holes' in the fitting when the join area is being heated. The capillary action draws in the molten solder, giving the names 'end feed' and 'touch feed' to these types of capillary joint.

The difference between pre-soldered,

2 *Use a clean brush or spatula to apply flux to the contact surfaces. A mild non-corrosive form is suitable for copper pipework.*

3 *Once the pipe has been seated in the fitting, remove any excess flux with a cloth—residue may cause solder streaks and a poor join*



4 *Heat the general area of the joint as a first step. On very large bore fittings this is not normally necessary*

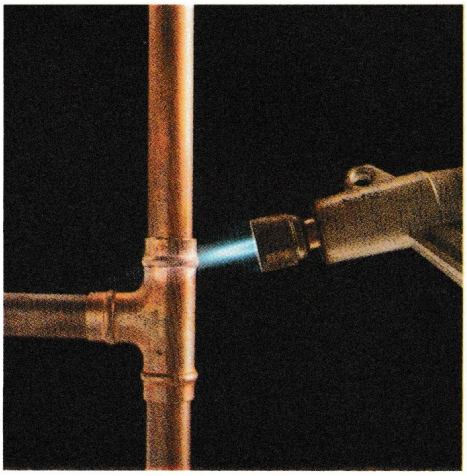
end-feed and touch-feed capillary joints is slight. You should choose whichever is most convenient. All are relatively inexpensive. Each is available in several forms, although the range is normally restricted to connecting fittings such as bends, tees, reducers, and stop-ends. Capillary fitting bends are frequently used to get round the need to make these in continuous pipe lengths.

Making a capillary joint

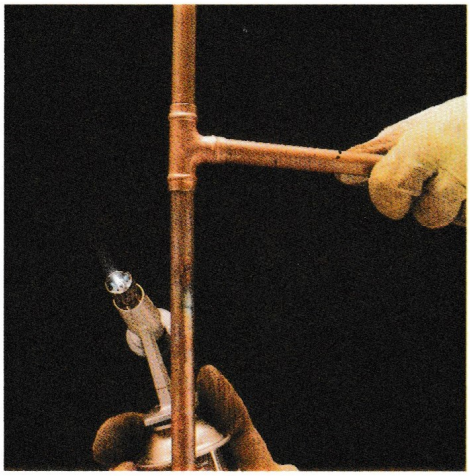
Any new pipework is cut and prepared as for a compression joint (see pages 50-55). To make sure of a good solder joint, the pipe ends—both old and new—must be burnished clean, as must the inside contact area of the capillary fitting itself. Fine glasspaper or wire wool can be used for this (fig. 1). Grease can be removed with turps or white spirit.

Assemble the pipe and fitting after carefully smearing the contact surfaces with flux (fig. 2). Wipe off any excess once the pipe has been bedded in the fitting, otherwise molten solder may run where the flux remains (fig. 3). An internal stop prevents the pipe being pushed inwards too far.

With pre-soldered capillary joints all that is then required is to heat evenly the area of the join with the blowlamp until solder is seen at the rim of the fitting (figs 4, 5 and 6). With the joint still under heat, try to rock the pipe in its seating. This should not be possible if you are using a correctly matched pipe and fitting, but the action does seem to encourage the capillary action of the solder. Take care not to over-heat the joint area as this could cause the breakdown of the flux, and the solder to blow out of the fitting.



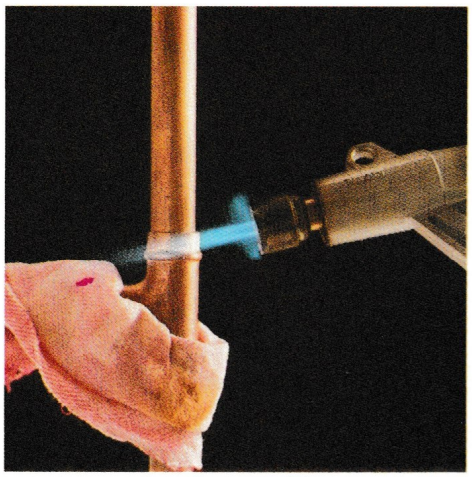
5 *Come in close with the hot central part of the flame—the blue flame on a gas torch—and heat the join area only*



6 *Draw the flame away as the solder begins to melt. Try and wiggle the joint, and reheat this area until molten solder forms a ring*

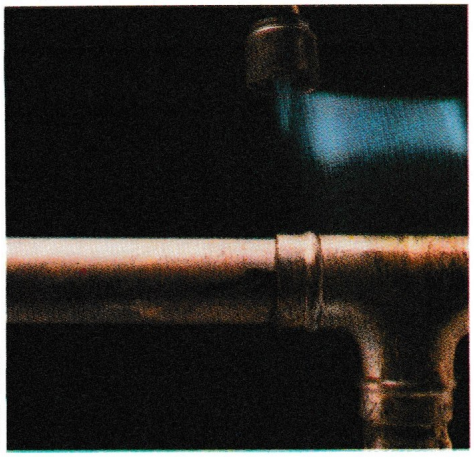
The procedure is slightly different for an end-feed or touch-feed fitting. These should be fluxed and then heated evenly until the copper is hot enough to melt solder wire held against it at the rim of the join or at the touch hole (fig. 8). From time to time, prod the pipe with the solder wire to find out when this soldering temperature is reached (or watch out for vaporizing flux). As the solder wire melts, lead it slowly round the rim—or hold it at the touch holes—until no more molten solder is drawn into the join (fig. 9). Finish off by leaving a ring of solder to act as a seal at the join rim (fig. 10). This additional precaution can be used with pre-soldered capillary joints as well. Remove residue flux when the joint has cooled.

Make quite sure that no movement



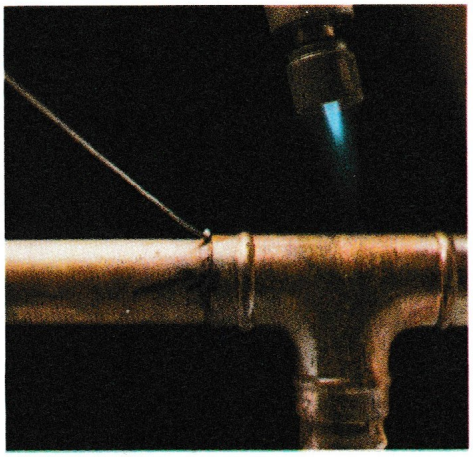
John Ward

7 *An incomplete ring at the rim indicates a suspect join. Remelt and rectify, covering other joins with wet cloth to prevent damage*

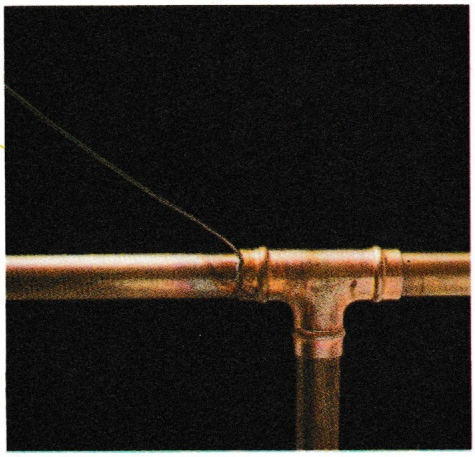


John Ward

8 *In the case of an end feed or, as here, an old and cleaned-up pre-solder joint, heat the general area of the fitting. Note the mark to check slip*



9 *At the correct temperature, solder melts on contact with the metal. Feed solder around the rim until no more is drawn in*



10 *Finish off all joints with an additional ring of solder near the rim edge. For a pre-soldered joint do this as the solder melts*

occurs between the pipe and fitting when the assembly is allowed to cool —any movement then can greatly affect the strength of a solder joint. The tightness of pipe and fitting is usually sufficient to prevent this but, to be sure, scratch or pencil a reference mark on the copper piping when this is fully butted into the fitting, so you can check for later movement (fig. 8). Movement during soldering can be corrected there and then.

With most fittings, you need to make two joins that are quite close together. It is always better to do them both at the same time. If for some reason one of the joins causes problems and continued heating of this is likely to cause the other to melt, wrap a wet cloth round the sound joint to keep its temperature down while you deal with the problem end. Adopt the same procedure if, later, you spot a fault in one or other of the joins, and this needs re-doing.

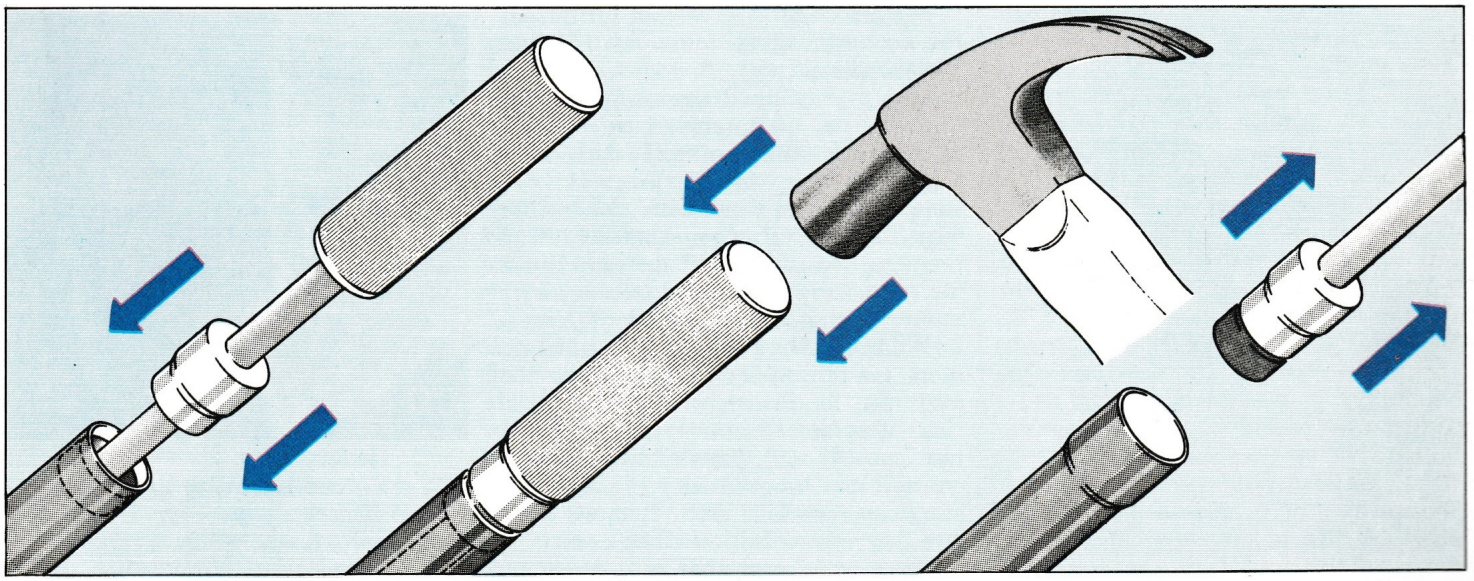
Suspect a touch-feed join if solder does not run freely into the holes, and remake. Similarly, reject an end-feed join if solder does not disappear into the socket before welling up. Problems with pre-soldered joints are few, but check that the solder has formed a complete ring at the rim.

D. *Using an expanding ('swageing') tool to widen slightly copper pipe used for an expanded joint. The punch is self-locating and quite easy to use*

Making an expanded joint

Another method of joining same-size copper piping—and one that makes use of end-feed capillary soldering techniques—is the *expanded joint*. Used mainly for larger bore piping—15mm, 22mm and, possibly, 28mm—the attraction of this joint is its neat appearance, negligible cost and relative convenience. An *expanding tool* or *punch* matching the pipework diameter is an inexpensive requirement. Alternatively, consider hiring a pair of *expanding scissors* if same-size piping in different diameters is to be joined.

The purpose of both types of tool is to 'bell' out the end of one length, enough for the other to socket into place (fig. D). The punch end does this by expanding sideways when struck with a hammer; the scissor-like tool relies on outwards leverage. A centring spindle on the punch—and the shape of the business end of the scissors—keeps the bell shape symmetrical and centred to the pipe. Follow the tool's instructions on use



Hayward Art Group

closely for best results.

If you decide to make expanded joints in preference to capillary or compression connection fittings, spend some time practising on spare bits of piping before making an attempt on the workpiece itself. The most common problems include over expansion (the other pipe end should fit snugly in place) and splitting (which may be prevented by first annealing the area). Small hairline cracks can sometimes be permitted—make sure that sufficient solder is used to fill these—but a new joint is better.

Always expand an end that has been properly cut and prepared. After expansion, burnish—as best as possible—the inside surface contact area. The normal diameter tubing is bevelled at the edge using a flat file to ensure a good seating, and the outside surface burnished. There should be no play in the fitting.

Carefully apply flux to both the contact surfaces and fit the two pipes together, checking for a firm fit, and then remove excess flux.

As with a standard capillary fitting, heat the join area until the flux starts to vaporize and solder starts to melt when held in contact with the metal. Continue soldering as for an end-feed fitting, checking that sufficient solder is drawn in to the contact area. Allow the joint to cool before checking the strength of the bond, and then remove residue flux.

Working with stainless steel

Stainless steel piping is often used with copper pipework runs, especially on parts of the run on display or in actual use (such as a heated towel rack). It is rarely used as a complete alternative because of its greater cost, but can be recommended for situations where its inherent strength and hardness might pay dividends.

Stainless steel piping is available in all standard sizes for domestic uses and can be cut, prepared and joined in much the same ways as for the copper variety.

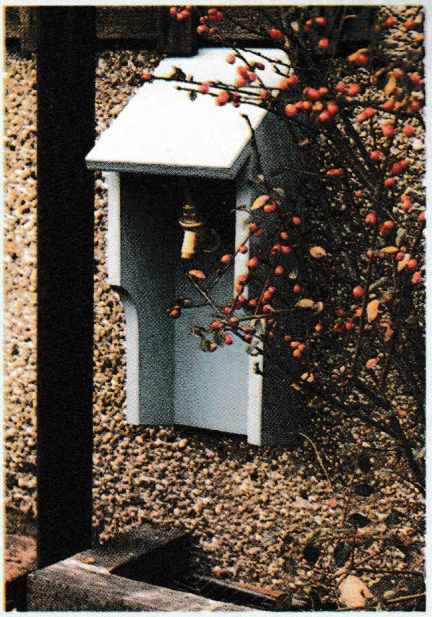
A significant joining difference is that fluxes based on phosphoric acid must be used to offset the high corrosion resistance of stainless steel. These fluxes come in paste form and must be applied with a clean brush or spatula. They are active when soldering temperatures are reached but almost harmless to stainless steel when the joint has cooled. Heat should always be applied to the fitting and not the tube as stainless steel is a poor conductor.

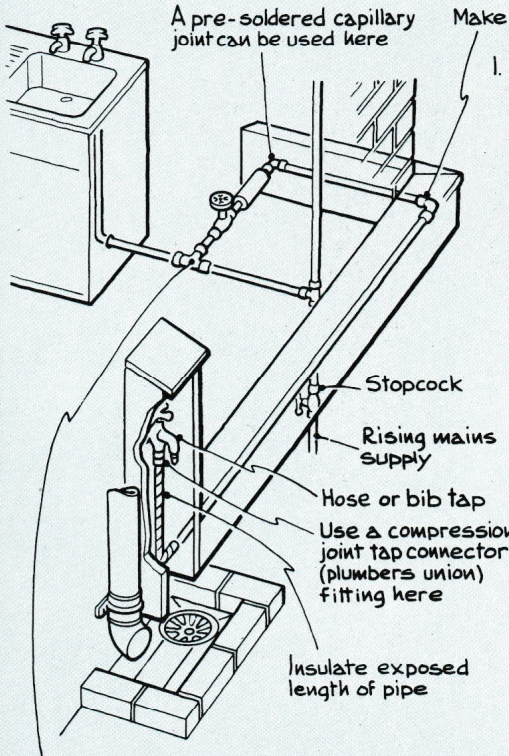
Install an outside tap

An outdoor tap is an almost indispensable feature of a busy and well-used garden. While it is possible to run a pipe to a central location in the garden, adding an extension to an existing indoor water supply, and running the pipework to a convenient point on the outside wall is usually more convenient and less expensive.

You may need permission from your local water authority to install an outside tap. They can also help you with general questions on the feasibility of your project. (In some installations a low-pressure, gravity feed system may not have enough force to operate a standard hosepipe.)

You could employ a professional to drill and later make good the wall holes but the job is straightforward enough to do yourself if you have the right tools.

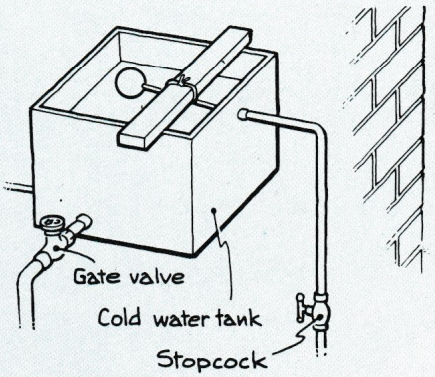



A pre-soldered capillary joint can be used here
Make bend or use fitting
Stopcock
Rising mains supply
Hose or bib tap
Use a compression joint tap connector (plumbers union) fitting here
Insulate exposed length of pipe

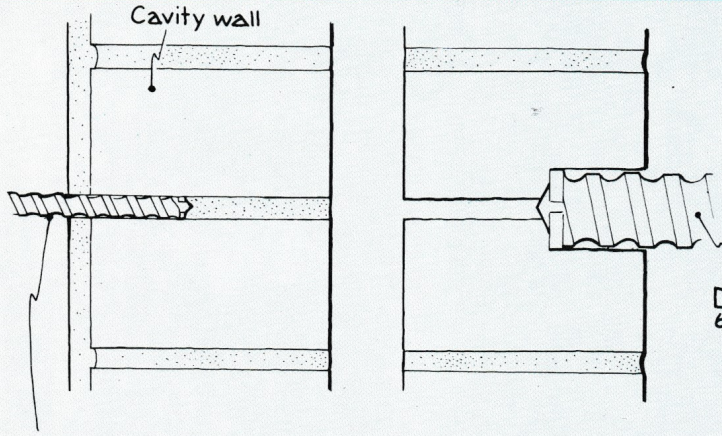
1. Plan the pipework route so that you can locate the outside tap above a soil pipe drain or a convenient soakaway. It may be easier to run most of the pipework along the interior if fitted cupboards, kitchen appliances, and covering the bare pipe do not pose problems. This gets round the need for boxed-off insulation on the outside. Use pipework of similar bore to supply pipe.

2. Locate and turn off water supply. If you are tapping a low pressure system, tie the water tank ballcock up and drain the tank if a stopcock and gatevalve cannot be found. Check with your local authority on their regulations over interrupting a rising main (high pressure) system. Check also that the low pressure supply has sufficient water pressure to operate a hose if you have this system.

3. When the water supply has been turned off remove a small length of the cold water supply pipe to match fitted length of 'T' connector compression joint (use capillary joint if blowlamp use is not dangerous). A stopcock should be fitted on the new pipework.



Advertising Arts

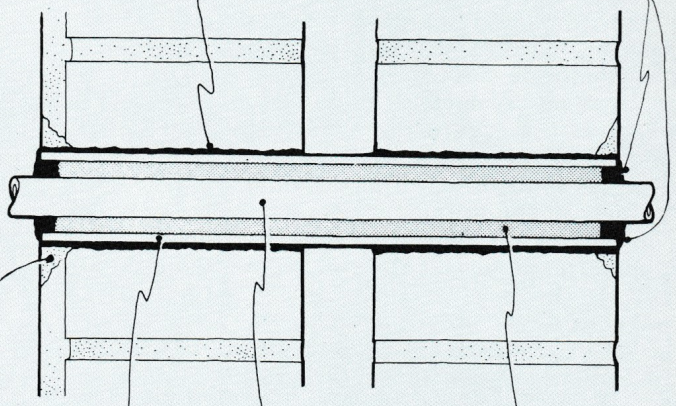


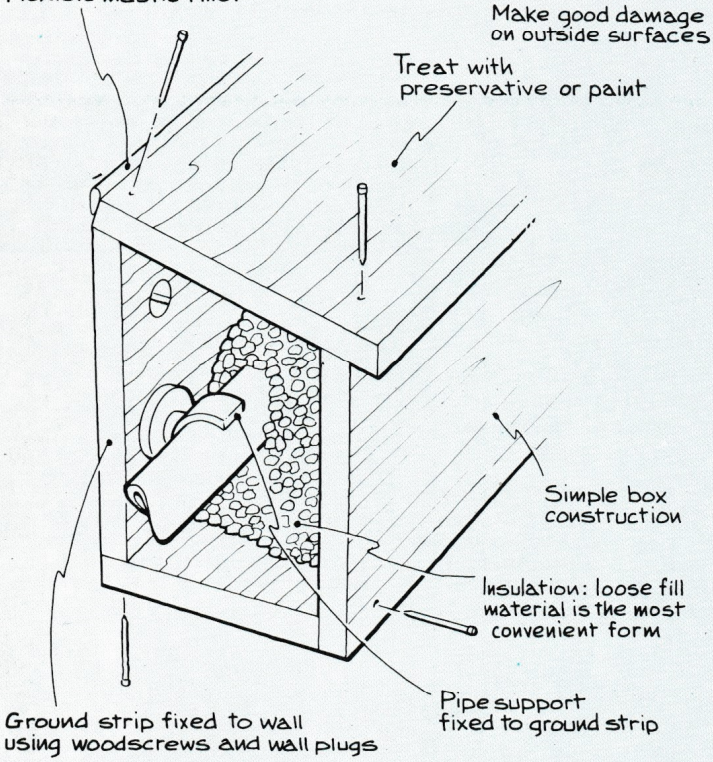
Locate mortar intersection and drill from inside with long masonry 6mm bit.

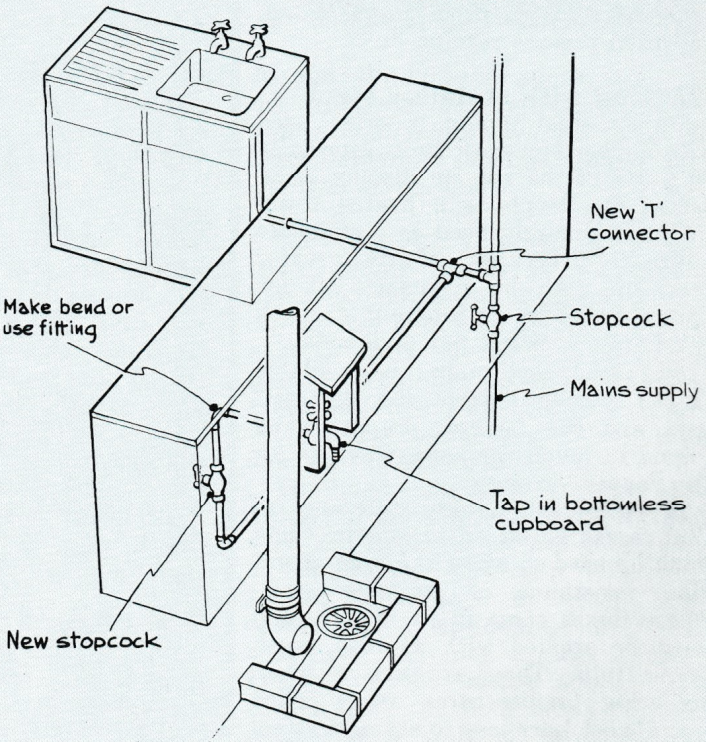
4. From the inside drill a 6mm pilot hole using a power drill and a long masonry bit. When the hole has breached the outer wall, widen the gap to 25mm using drill, masonry chisel or star chisel.

Drill from both sides to widen 6mm hole to 25mm

5. Use a larger bore tube (PVC) to act as a duct for the garden pipe. Seat this in place on a bed of flexible mastic and make good damage at wall surface using cement or filler. Tightly insulate the garden pipe to prevent draughts


Flexible mastic
Seal off tube ends with flexible mastic
Make good damage on outside surfaces
22 mm PVC pipe
15mm pipe
Insulation stuffed into place between outer and inner pipes, and sealed each end by a ring of mastic


Flexible mastic fillet
Treat with preservative or paint
Simple box construction
Insulation: loose fill material is the most convenient form
Pipe support fixed to ground strip
Ground strip fixed to wall using woodscrews and wall plugs



6. The length of outside pipe needs to be properly insulated against frost damage.

Make an insulation box with a matching bottomless cupboard for the tap. Nail and glue box components together: start with base and fix this to ground strip which is then attached to wall. Then add side and top to complete box

View shows new pipework on inside of house. The pipe can be concealed by running through cupboards and kitchen units

Advertising Arts

Contents so far

Home designer
Lighting for living rooms 4
Project: Make your own side lamps
Make the most of your windows 37
Project: A simple Roman blind
Bathroom problems solved 65
Project: Space-saving storage
Planning a kitchen 100
Project: Flap-down table
Choosing colour schemes 126
Project: Mix and match

Project
Custom-built bedhead 10
Shelves with a difference 56
A simple sofa 78
Glamorous make-up unit 106
Versatile coffee table 138

Repairs and renovations
Facelift for furniture 16
Project: Stencil magic
Gutter repairs 60
Repairing skirting boards 142

Masonry course
1 Basic bricklaying 20
Project: Build a barbecue
2 Simple foundations 88
Project: A stepped planter
3 Building a quoin, bonding patterns 132
Project: An open bond wall

Plumbing course
1 Understanding your water system 26
Project: When a pipe bursts
2 Working with copper pipe 50
Project: Fitting mixer taps

Decorating course
1 Decorating with tiles 30
Project: Stylish tiled worktop
2 Wallpaper without fuss 82
Project: Ideas for wallpaper borders
3 Painting interior woodwork 110
Project: Designs for doors

Carpentry course
1 Squaring up, sawing and sanding 44
Project: Indoor/outdoor suite
2 Nailing and screwing 72
Project: Build a bunk bed
3 Gluing and cramping 93
Project: Simple picture frame

Heating and ventilation course
1 Heat-loss through the roof 116
Project: Insulate your loft

Home electrics course
1 Electricity in the home 121
Project: Mend a fuse and wire a plug

Acknowledgements

Pages 149-155: Verity Mirrors, 6 Mount Row, London W1Y 6DY.
Pages 156-159: Brick Development Training Association Ltd., The Hyde, Edgware Rd., London NW9.
Pages 160-164: Chubb & Son Ltd., 14 Tottenham St., London W1. Yale Security Products, Wood St., Willenhall, W. Midlands WV13 1LA.

Where to buy it—UK

On reflection Pages 149-155
Sliding door mirrors from: Panavista Ltd., Fircroft Way, Edenbridge, Kent.
Smoke glass panels from: Sekon Glassworks Ltd., Essian St., London E1

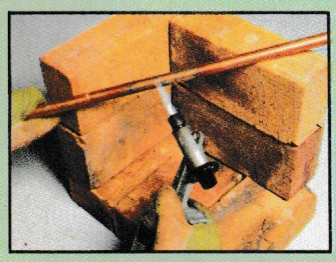
Plastic mirrored sheet from: Amari Plastics Ltd., Unit 2, Cumberland Ave., London NW10 7RL
Visijar Laboratories Ltd., Pegasus Rd., Croydon, Surrey

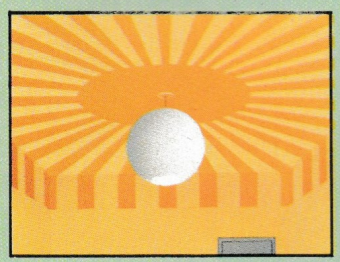
First steps in plastering Pages 156-159
All materials and tools freely available from builders' merchants.
Advice on plastering materials from: British Gypsum Ltd., 15 Marylebone Rd., London NW1

Simple security Pages 160-164
Mortise locks: Chubb Security Services Ltd., 44 Chancery Lane, London WC2, will give advice on their lock centres throughout the UK

Australia
On reflection Pages 149-155:
Mirror tiles are available from specialist 'Home Decorator' shops. Acrylic plastic mirrors which you mount on chipboard yourself are obtainable from Cadillac Plastics who have branches in Sydney, Melbourne, Brisbane and Adelaide and Plastics Trading Co. who have branches in Sydney and Melbourne.

In next week's issue





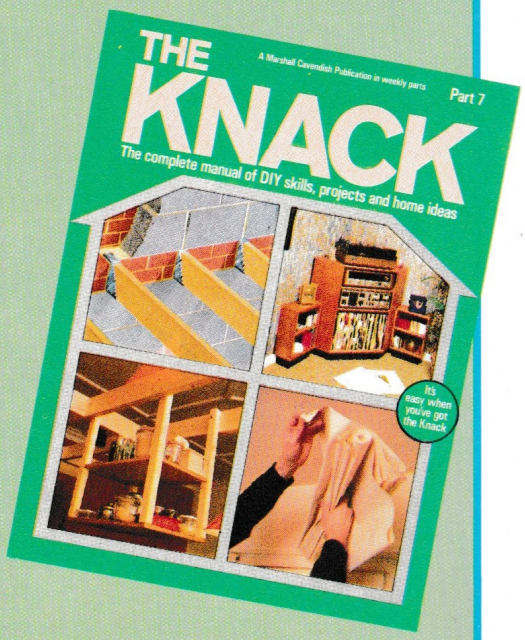
Finding and making storage space: No matter how large a house is, storage space always seems to be at a premium. We show you how to make the best use of yours and give plans for a simple yet practical cube storage project.

Floorboard repairs: Loose and creaking floorboards are not only a nuisance—they can often be dangerous. Step-by-step, we describe how to lift boards and many other vital repairs.

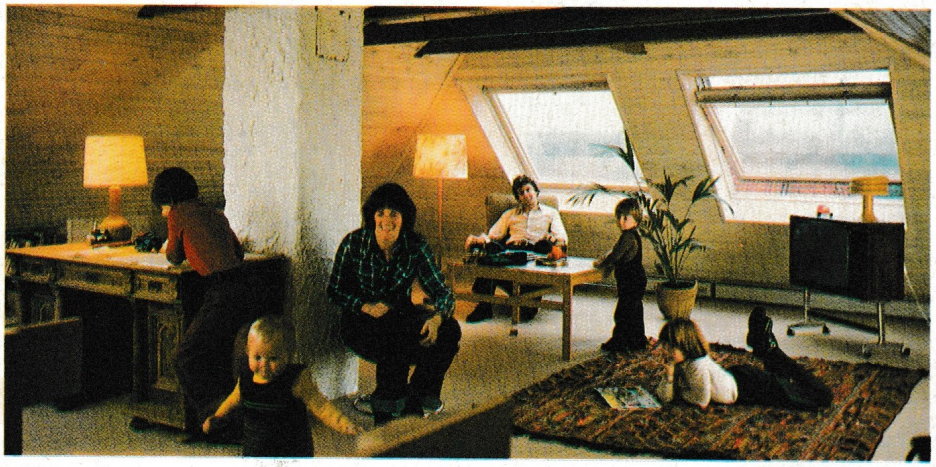
Hi-fi corner unit: Finding somewhere safe for the stereo can often prove difficult. Our main project shows you how to build an attractive cabinet which will keep it out of harm's way—and make use of that wasted corner space

Papering ceilings: This is one aspect of decorating where you can get into a real mess unless you know what you're doing. We show how the professionals do it and give you some unusual ideas on ceiling decoration.

Bending pipe: An important plumbing technique which is often overlooked, pipe bending allows you to get round tricky obstacles without having to spend a fortune on expensive fittings. Included is a heated towel rail project.


THE KNACK
A Marshall Cavendish Publication in weekly parts
Part 7
The complete manual of DIY skills, projects and home ideas
It's easy when you've got the Knack

You may not need to move house to get an extra room.



Because you already have it.

Sometimes it's hard to see what's under your nose. Or in this case, above your heads.

You may have plenty of room in your house, perhaps 20% more than you're living in now, if you use your roof space.

With Velux roof windows, using your roof area becomes a real possibility.

Velux give you considerable savings on what may be the biggest single expense of a conversion—letting in light. Because they are designed for attics, Velux windows are quick and easy to install. If you're handy you can probably put them in yourself.

So open your eyes to the chances of using your roof space. For a brochure full of ideas and windows, write to: Dept K68, The Velux Company Limited, Eastfield Industrial Estate, Glenrothes, Fife KY7 4NX.

VELUX

Roof Windows